TIM

AD-A024 700

DDC 10 YEAR REQUIREMENTS AND PLANNING STUDY

Volume I: Executive Summary

AUERBACH ASSOCIATES INC.
121 North Broad St.
Philadelphia, Pa. 19107

13 June 1976

Final Report for Period 19 June 1975 - 13 June 1976

Prepared for

DEFENSE DOCUMENTATION CENTER
Cameron Station
Alexandria, Va. 22314

Encl 1

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A024 700
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle) DDC 10 Year Requirements and Planning Study Final Report Volume I: Executive Summary	5. TYPE OF REPORT & PERIOD COVERED
	6. PERFORMING ORG. REPORT NUMBER AUER-2325/2326-TR-5
7. AUTHOR(s) Jerome T. Maddock, Thomas J. McGeehan, Martha Cornog	8. CONTRACT OR GRANT NUMBER(s) DSA-900-75-C-5161
9. PERFORMING ORGANIZATION NAME AND ADDRESS AAI (AUERBACH Associates, Inc.) 121 North Broad Street Philadelphia, Pennsylvania 19107	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS DSA-658-01S
11. CONTROLLING OFFICE NAME AND ADDRESS Defense Documentation Center Cameron Station, Building 5 5010 Duke Street, Alexandria, Virginia 22314	12. REPORT DATE 12 June 1976
	13. NUMBER OF PAGES 68
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) SAME	15. SECURITY CLASS. (of this report) UNCLASSIFIED
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for Public Release; Distribution Unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

N/A

18. SUPPLEMENTARY NOTES

User survey planning, training, and data reduction performed by subcontract to: CRITERION DEVELOPMENT ASSOCIATES, INC., Suite 1218, White Station Tower, 5050 Poplar Avenue, Memphis, Tennessee, 38157. Dr. Charles T. Kenny, Consulting Psychologist.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

INFORMATION SYSTEMS	SURVEYS	DOCUMENTS
REQUIREMENTS	INFORMATION RETRIEVAL SYSTEMS	PLANNING
TECHNICAL INFORMATION	MANAGEMENT REQUIREMENTS	RESEARCH MANAGEMENT
INFORMATION TRANSFER	PROJECTION	
FORECASTING	TECHNOLOGY	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Three recommended DDC goals and a series of related objectives were derived from a planning study to assess current and future Defense Research, Development, Test, and Evaluation (RDT&E) community needs in the years 1978-1988 for DDC's scientific and technical information (S&TI) services. They are: Provide new and improved information products and services, achieve maximum potential for coordinating the RDT&E information program; and market RDT&E information products and services. These goals are subdivided into a series of S&TI

objectives, and the objectives into a series of tasks. Time phasing for the years 1978-1988 is given for these objectives and tasks.

In addition, this volume presents overall study conclusions concerning DDC's previously proposed plans, current and planned DDC services, and general conclusions regarding anticipated trends in information transfer in the 1980's.

Volume II of this Report contains discussion of major project tasks, a list of persons and agencies associated with the study, a Bibliography, and a Glossary.

DDC 10 YEAR REQUIREMENTS AND PLANNING STUDY

VOLUME I: EXECUTIVE SUMMARY

AUER 2325/2326-TR-5

June 13, 1976

Contract Number DSA900-75-C-5161
Sequence Number A004
Authority (Data Item Number)
UDI-S-006

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Final Technical Report
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SECTION I. INTRODUCTION AND SUMMARY

This Final Report presents a summary of AAI (AUERBACH Associates Inc.) findings, conclusions and recommendations, resulting from Contract DSA900-75-C-5161, Engineering Services to Assess Current and Future Defense Research, Development, Test, and Evaluation Community Needs for DDC's Scientific and Technical Information Services.

1.1 PURPOSE AND OBJECTIVE OF THE CONTRACTUAL EFFORT

The Defense Documentation Center (DDC) of the Department of Defense (DoD) has the mission to develop new and significantly improved scientific and technical information (S&TI) products, services, and systems for the direct support of the Defense Research, Development, Test and Evaluation (RDT&E) program. The purpose of such products, services, and systems is to increase, both qualitatively and quantitatively, the productivity of the Defense RDT&E program. Accordingly, it is necessary to identify, establish and pursue S&TI objectives whose achievement will satisfy current and projected requirements of the actual users of Defense S&TI and Defense scientific and technical management information. To fulfill this purpose, five objectives were to be achieved by the contractual effort:

- Identify and document the S&TI and RDT&E management information requirements of the DoD RDT&E community for the 1978-1988 time frame.
- Identify user problems with acquisition and application of S&TI/RDT&E management information provided by DDC or other Government or Non-Government sources.
- Evaluate DDC's internally established long-range objectives in relation to the findings of this study.
- Formulate a definitive set of time-phased developmental efforts to satisfy user population S&TI and RDT&E management information requirements during 1978-1988 and to rectify problem areas identified.
- Describe DDC's role in the 1978-1988 S&TI and RDT&E management information community.

These objectives have been met by the AAI project effort as follows:

- The first objective has been met through a survey of users and potential users of DDC (User/Potential User Survey), a survey of 14 information processing agencies, (Interagency Survey), and a technology assessment performed by a series of expert panels (Expert Panel Review), as described in Sections I, II and III of Volume II of this Final Report.
- The second objective has been met by the User/Potential User Survey Task, as described in Section I, Volume II of this Report.
- The third objective has been met by the "Review of DDC Plans" discussed in Section IV of Volume I of this Report, Conclusions.
- The fourth objective has been met by Section II of Volume I of this Report, Statement of DDC S&TI Objectives for 1978-1988, and Section III of Volume I, Schedule of S&TI Objectives for 1978-1988.
- The fifth objective has been met by the Interagency Survey Task, as described in Section II, Volume II of this Report.

The above-mentioned tasks (plus a literature review) are depicted in Figure 1, Work Element Chart. Findings and conclusions derived from each of these four tasks formed the basis for AAI's recommended DDC goals and S&TI objectives discussed in Sections II and III below. The findings and conclusions are the result of the cross-correlations of individual task results, which have been documented in detail in interim project reports.* The findings are summarized below in terms of four areas: technology, organizational structures and affiliations, economics and marketing, and services. Following is a summary of the review of DDC plans, a summary of conclusions, and a summary of recommended goals and objectives.

1.2 SUMMARY OF FINDINGS

1.2.1 Technology

- General: Complete electronic control over information processing operations is desirable, although the feasibility of complete control is questioned by the experts. However, evolving computer technology offers the potential for complete data control for retrieval processes. Eventually (beyond 1988) the primary records will be electronically stored. Then all types of information operations, including physical transport of materials in the distribution functions, will be supported through the use of machine-readable files combined with electronic communications.

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*Items 9, 10, 11, and 13 in the Bibliography in Volume II of this Final Report.

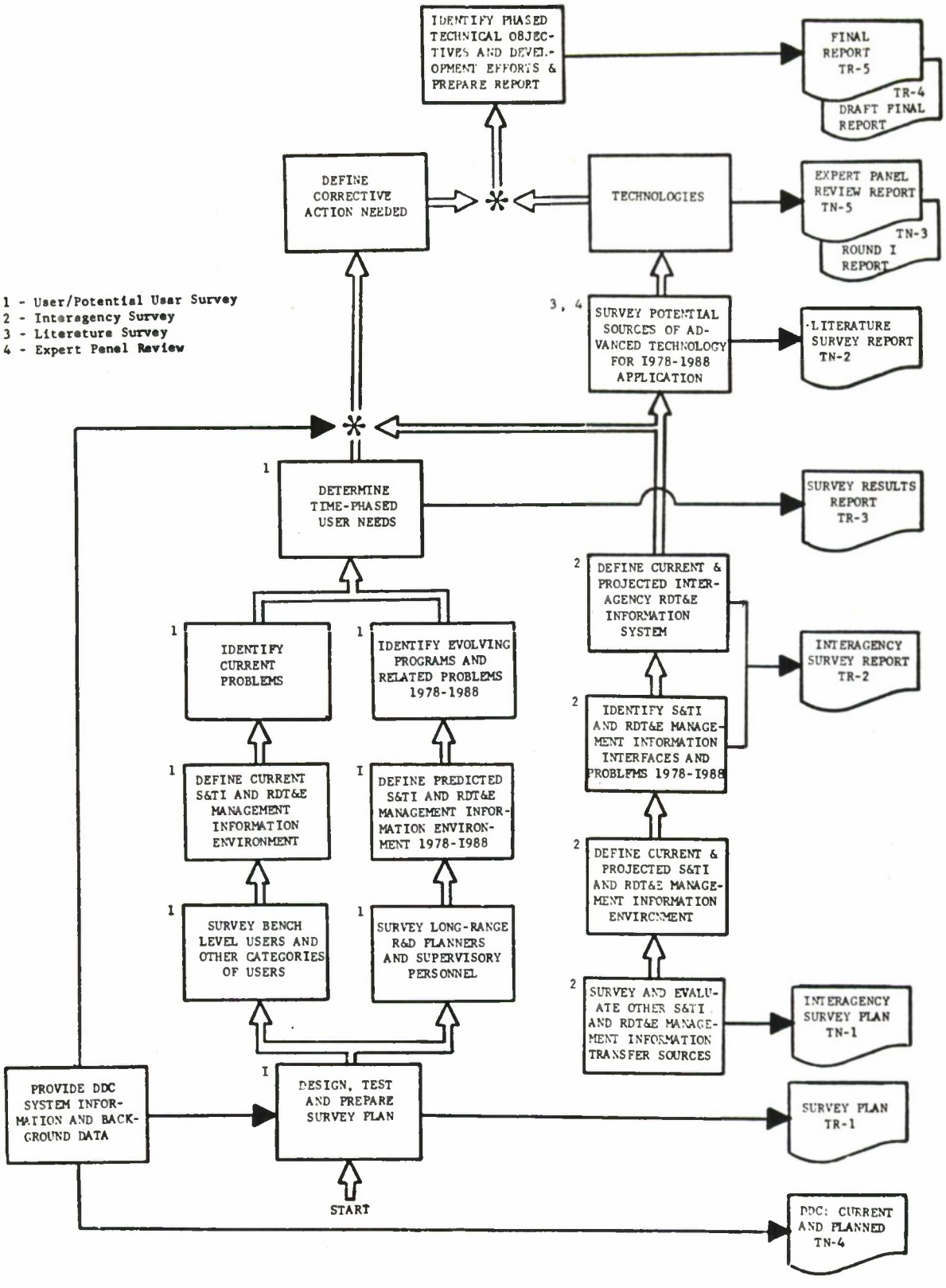

Figure 1. Work Element Chart

- Mode of Processing: For some time to come, batch processing of large scale, centralized files will be an important mode of operation for the information community. But on-line interactive computer systems are becoming increasingly attractive from both the cost and service viewpoints.

- Hardware: Emerging are new applications in peripherals which may be especially adapted for bibliographic and full text processing, notably optical character recognition (OCR) input devices and word processing equipment. It is unlikely, however, that either input process will be wide-spread before the late 1980's. Automatic text input devices are seen as potentially desirable, however, and only slightly ahead of the current state-of-the-art.

  Another anticipated development in peripherals is the inexpensive "personal" interactive computer terminal. Whether or not the "personal" terminal becomes a reality, interactive terminals will proliferate and become more available to all researchers in the next decade. Interactive terminals and other types of peripherals may also be coupled with minicomputers (and eventually, microcomputers) resulting in "intelligent" terminals, with applications such as data manipulation, intermediate data processing, and local data control.

- Software: Purchasing of software packages is seen as a desirable alternative to de novo programming. Packages with monitoring and tutorial features for on-line interactive systems can be available in the short range time period. The importance of on-line tutorial assistance is linked to the growth of personal interactive search services. Machine independence is also seen as a trend favorable to enhanced information processing. However, it is regarded as a mid-range achievement, delayed into the 1990's by inherent inefficiencies of machine independent software.

- Communications: Total electronic point-to-point communication is seen as highly desirable. Supporting events leading toward that all encompassing, long range event show a set of short and mid range achievements including:

  - widespread availability of computer terminals
  - broader use of dial-up communication systems
  - electronic file transfer at reasonable cost
  - facsimile transmission of supporting material

- Storage and Dissemination Media: Microform will be the prime storage medium for large bibliographic files for at least the next decade. However, beginning in the 1980's, machine-readable digital storage will begin to be cost competitive with paper and microform for numeric data files first, then bibliographic surrogate files and ultimately full text files. However, no media will ever completely replace or be more acceptable than paper.

- Human Interface: The essential problems of intellectual information transfer are identified as the "important" gaps in information technology, such as system design problems involving machine-machine interface, man-machine interface and interorganizational interaction.

1.2.2 Organizational Structures and Affiliations

- Cooperation and Networking: Frequent and intensified cooperative efforts are forecast as desirable and feasible, particularly among agencies with complementary capabilities.

  For networking and interactions of data bases, "independence with cooperation" was predicted to be the predominent characteristic. International exchange of selected technical information and multinational cooperative networking ventures are significant emerging trends. Feasible events point toward development of interface mechanisms to ensure compatibility without rigid interagency standardization.

- Standards: Events relating to standardization are regarded among the most important and as most desirable and feasible. However, standardization should not be viewed as part of a move toward coalescence into some form of a consolidated national system, but rather as a matter of common interest to facilitate interagency communication and information exchange. The major information agencies acknowledge the value to be derived from development and adoption of universal information processing standards. But no real support is found for compromising existing conventions without significant local advantage.

- Centralization vs. Decentralization: Localized facilities are expected to be a vital component of information-providing organizations for the foreseeable future. The majority opinion of those surveyed is that local facilities staffed by personnel trained in information retrieval techniques can provide end users with a higher quality of service than can a large, centralized facility. Thus, for the foreseeable future, large processors, such as DDC, must function with a structure that permits and encourages smaller or more specialized information agencies to deal directly with users, even if the central agency elects to provide some "retail" services directly to users.

1.2.3 Economics and Marketing

- Costs: Cost factors are not inherent barriers to advancing information technology. Downward costs are forecast because of increased production and more widespread use of digital technologies which will result in lower costs per unit for hardware and software (in terms of current dollars). Communications costs will also drop, although not indefinitely.

- Funding: Both R&D funding and operating costs for Federal technical information services will require at least partial subsidy in the future. Efforts to achieve total cost recovery are viewed as undesirable and unfeasible. In addition to the negative influence on the use of information services, such efforts are likely to retard experimentation with new concepts and services at a time when such experimentation is seen as essential to real progress in information processing technology.
- User Charges: The overwhelming majority of users are unaware of the costs of information services. However, users as a whole appear willing to pay "a little bit more" for improved information services and information services tailored to their precise needs.
- Marketing: Marketing efforts, including brochures, training manuals and other user awareness efforts, have had minimal success in those information agencies where they have been employed. However, many users feel that training programs of some kind in information services would be useful to them.

1.2.4 Services

1.2.4.1 General

- Access to Information: Access to comprehensive information stores should appear direct and "simple" to the user. While in the long range, total electronic control and manipulation of information processes may provide the means for accomplishing widespread and comprehensive accessibility, the human intermediary is essential to act as a logical connecting node in an accessible, but complicated, technical information environment which will persist into the 1990's. Also important is the ability by intermediary and end user to pursue an interactive search strategy.
- Fact Services*: Current technology is predicted to be capable of supporting "fact information services", including numeric values and also pieces of discrete data capable of satisfying inquiries without further reference. Files such as the NBS National Standard Reference Data Files and unique files compiled by the IAC's are characteristic of the special data bases that are emerging. Increased user insistance on such support is forecast.

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*"Fact service" is a concept which includes a variety of information services in both S&TI and management information, both numerical and non-numerical. Some types of fact services are:

- Provision of numeric data tables
- Provision of management statistics
- Automated retrieval of "answer-providing passages" from machine-readable text
- Provision of project and staffing information (who, what dollar value, etc.)

- Information Analysis: Information analysis, like fact retrieval, is an extension of information services that goes beyond the provision of citations and document retrieval. This, too, is an event that is regarded as important, but not desirable or feasible for "all researchers."

1.2.4.2 Evaluation of DDC Products and Services

- There are no significant differences found between DDC and other information providing agencies in terms of quantity, quality, response time, currency, media, or formats of the information provided. Users perceive the services provided by the DDC and comparable agencies as approximately equivalent in meeting their needs in these respects.
- The best known and most useful DDC demand service was found to be the Technical Report Program (those services which announce and make available copies of DoD technical reports), which is followed closely in awareness and popularity by Report Bibliographies (those services that provide DoD report-literature bibliographies on demand).

  Among the subscription services, the Technical Abstract Bulletin (TAB) was found by far the best known and most useful, followed by the DDC Digest.
- DDC's RDT&E management services, (i.e., Work Unit Information System, Independent Research and Development and Program Planning Reports) serve only a select group of managers directly. The Interagency Survey indicates that these services provide descriptive information, which is supplementary but not directly useful for decision making by line managers. Consequently, there is a gap in the provision of planning and control information that is analogous to the gap in the provision of fact service to bench personnel.
- Formal information products and services (including IAC services) reach the bench (and management) personnel through the support personnel in in-house libraries. This finding is supported by the following:
  - 50.7% of all User/Potential User Survey respondents chose the in-house library as their primary source of information.
  - Bench and management personnel are in themselves low IAC users (no IAC is used by more than 7.9% of either bench or management respondents). However, since the support personnel use the IAC's more heavily (the DSA IAC's are used by from 10-42% of the support personnel questioned), it is likely that they are acting as IAC intermediaries for bench and management personnel.

1.2.4.3 Problems and Requirements in Information Use

- On the whole, DDC users felt that current DDC information services meet their needs at least half the time.
- Information service from all sources was evaluated on a scale of 1 (high) to 5 (low) in terms of quantity, quality, response time, currency, formats, and media. A higher degree of problems were reported for quantity, quality, response time and currency (scores of 2.35, 2.31, 2.26 and 1.98 respectively. The higher the score, the more problems experienced.)
- A higher degree of problems was anticipated for the future in terms of quantity, quality, response time and currency than for formats and media. (Approximate scores of 4.1, 4.0, 4.0 and 4.2 as compared to 3.3 and 3.6. It can also be seen that these scores are significantly higher than the scores for current problems given above, indicating a significant increase in problems anticipated by 1980.)
- Significantly increased demand is predicted for three categories of currently-provided DDC services:
  - Current Awareness Bibliographies (assuming unlimited availability of such targeted, user-profile-generated services)
  - The Defense RDT&E On-Line System (DROLS)
  - RDT&E management information services

1.3 REVIEW OF DDC PLANS

Informal plans prepared by DDC for the 1976-1986 period were reviewed, and in general, no major contradictions were found between these plans and the findings, conclusions, and recommended goals and objectives developed independently by the AAI study team. In addition to stated objectives, the AAI study provides descriptions of developmental efforts, or tasks, required to achieve these objectives as well as an implementation schedule.

1.4 SUMMARY OF CONCLUSIONS

- DDC's current services are, by comparison with other information transfer agency services, approximately state-of-the-art, and in general were rated between "fair" and "good" by users.
- DDC's Technical Report Program and related services (e.g., TAB) are best known and considered most useful.
- In the future, users will need prior review of documents for accuracy, and access to supporting data. These requirements emphasize the need for "fact services."

- Utilization of subscription (especially targeted) and on-line services is expected to increase in the future.
- Information technologies which are currently available are not being exploited by the information community.
- Networking and interagency cooperation can bring long term benefits through providing users with better access to many different information resources.
- Improvements in information transfer must recognize and deal with man/system interfaces and interorganization interactions.
- Priorities of R&D funding should emphasize the development of means to determine the costs and effectiveness of information.

1.5 SUMMARY OF RECOMMENDED DDC GOALS AND S&TI OBJECTIVES

A summary of major goals recommended as a result of the study are these:

- Goal I: Provide New and Improved Products and Services

  Examples are:

  - Critical data tables available in machine-readable form, accessible through DROLS or batch search
  - Fact and passage retrieval service, done by searching text of abstracts
  - Full text of technical reports available in machine-readable form
  - Expanded DDC Referral Data Banks including expert advice on use of non-DDC information resources
  - On-line access to other (non-DDC) data bases
  - IAC services made available centrally through DDC
  - Data bank of inventory of individual skills
  - Teleconferencing
  - Bibliographic current awareness service, individually profiled and provided for a fee on microfiche
  - Better document delivery provided through:
    a. Service from Regional Centers acting as depositories
    b. Fascimile delivery of documents from DDC to Regional Centers
    c. Full text transmission of documents from DDC to Regional Centers

- Goal II: Achieve Maximum Potential for Coordination of the RDT&E Information Program

  Includes:

  - Comprehensive DoD-wide management review and restatement of the information program objectives and roles (including those of DDC as well as those of programs offered inde-

pendently by the military branches)
- Review existing systems, define responsibilities assumed by local and central agencies and identify services for which no agency assumes full responsibility
- Design a means of measuring the effectiveness of DDC programs

- Goal III: Market DDC Products and Services

  Includes:

  - Provide (targeted) seminars instructing personnel in DDC services
  - Provide (targeted) "guidelines" for DDC products and services
  - Provide training programs in DDC services for:
    a. DoD contracting officers
    b. Support personnel in DoD and DoD contractor organizations
  - Establish means for obtaining continual user feedback and using user requirements as the basis for product and service improvement

Goals, objectives, and tasks for the 1978-1988 target period are presented in hierarchical fashion (Volume I, Section II) with a time-phased schedule for implementation (Volume I, Section III).

1.6 ORGANIZATION OF THIS REPORT

This Final Report serves to present AAI's conclusions and recommendations concerning DDC's role and projected objectives for the decade 1978-1988. Descriptions of all major project tasks are provided in Volume II. The Report is organized in two volumes as follows:

Volume I - Executive Summary

- Section I gives an introduction and summary of the entire Report
- Section II presents the recommended S&TI objectives that DDC should address in the years 1978-1988
- Section III gives a time-phased schedule for achievement of these objectives
- Section IV provides a review and validation of current DDC plans and services, and presents final conclusions

Volume II - Technical Discussion, Bibliography, and Glossary

- Section I documents the findings and conclusions of the User/Potential User Survey
- Section II documents the findings and conclusions of the Interagency Survey

- Section III documents the findings and conclusions of the Expert Panel Review
- The Bibliography lists 124 separate documents used in the contractual effort and cited in this Report by number
- The Appendix lists persons and organizations involved in the contractual effort
- The Glossary provides definitions of technical terms and acronyms in order to facilitate the reading of this Report

SECTION II. STATEMENT OF DDC S&TI OBJECTIVES FOR 1978-1988

This section presents the recommended DDC goals, and S&TI objectives* for the target period, 1978-1988. The DDC S&TI objectives were developed in the following sequence:

Step 1: *Review of Current Operations, Plans, Mission, Services, and Products*

To "set the stage" for the development of S&TI objectives, the AAI project team reviewed current DDC operations and short-range plans. These were compared with the DDC mission statement, as were the descriptions of DDC and DSA/IAC services.

Step 2: *Collation of Forecasting Data*

To provide a framework for discussion and analysis, the forecasting information obtained from a Literature Survey, an Interagency Survey, and an Expert Panel Review were categorized into four areas:

- Technology
- Organizational Structures and Affiliations
- Economics and Marketing
- Scope and Nature of Services

Step 3: *Prioritization through User Input*

The two foregoing steps provided a definition of:

- The role of DDC during the target period (1978-1988)
- The predicted technological and organizational environments in which DDC would play this role

The predicted user requirements and problems were used to modify and prioritize these predictions.

Step 4: *Setting of DDC Goals*

From the statement of user requirements and the definition of DDC's predicted role, the Project Team identified three major goal areas for DDC. These goals are the highest level of mission aims for DDC. All S&TI

*Please refer to the appended Glossary for definitions of the terms Goal, Objective, and Task as used in this Report.

objectives must be oriented toward accomplishment of these goals. (See Figure 2.)

Step 5: *Setting of S&TI Objectives*

Each goal area was analyzed in terms of means of its achievement. The means were established to respond to problems, requirements in each goal area and to be within the realm of technological desirability and feasibility (both current and forecast) of achievement. These means became the S&TI objectives for DDC.

Step 6: *Establishment of Tasks*

Specific tasks were designated for attainment of the stated S&TI objectives. The time phasing of these tasks was based upon the "most reasonable" period of feasibility obtained from the technological forecasting data. In some cases, the stated tasks are feasible using current technology. In others, a task is not forecasted to be technologically or economically feasible during the target study period, but it is possible to "gear up" to the point of task feasibility, and this is recommended, since the task is judged to be highly desirable and will contribute to achievement of DDC goals and objectives. Section III describes time-phasing in more detail.

Step 7: *Integration of Tasks into Plan*

After the DDC goals, S&TI objectives, and tasks had been documented, the task descriptions were reviewed for points of commonality. It was found, for example, that decentralization of some DDC activities will contribute to the achievement of more than one S&TI objective. When such conceptual points of commonality were identified, the timing of each point was reviewed to ensure smooth scheduling of developmental efforts. Where the accomplishment of one task under one objective was found to be dependent upon the completion of a separate task under another objective, this fact was noted and accounted for in the time phasing of the tasks. Several of these points of commonality among tasks are noted below:

- Decentralization of DDC Activities

  Several current and predicted events point to the need for decentralization of some DDC activities. These events include the need for improved user access to and

I. PROVIDE NEW AND IMPROVED INFORMATION PRODUCTS AND SERVICES

The growth of the DoD RDT&E program has been accompanied by growth in technical and management information associated with the program. DDC has been designated as the focal organization within DoD for the acquisition, storage, and dissemination of that information. As an adjunct to this responsibility, DDC is charged with the development of significant improvements and the removal of barriers to effective information transfer.

II. ACHIEVE MAXIMUM POTENTIAL FOR COORDINATING THE RDT&E INFORMATION PROGRAM

DDC can serve as the primary tool for coordinating a DoD-wide information program in support of all DoD, S&TI and RDT&E management information requirements. Pragmatically, DDC's potential to achieve this goal is defined by the direction provided by ODDR&E/DSAH and the military services it is designed to support. DDC should take a leadership role in defining the overall DoD information environment, exploring alternative means of achieving information objectives and demonstrating its capabilities to contribute effective products and services within the role defined for it by higher authority.

III. MARKET RDT&E INFORMATION PRODUCTS AND SERVICES

New and improved information products and services are of little value if potential users are unaware of their availability. System changes are not really true service improvements unless responses to user requirements are the basis for these changes. Marketing of information products and services must thus incorporate the dual functions of "outreach" (or user awareness) and "feedback" (or communication of problems and requirements).

Figure 2. DDC Goals for 1978-1988

awareness of DDC products and services, the predicted need to improve document delivery, and the predicted trend toward distributed information processing. Building upon the decentralized DROLS/DCASR experiments of the Contractor Access Program, DDC should establish regional centers of coordination, marketing, retrieval, and document storage and delivery activity. At a separate level, duplication of DDC input and processing activities can be minimized if these functions can be at least partially transferred to contributor organizations which already perform these functions internally.

- Machine-Readable Text

  Although not currently feasible because of technological limitations and economics, the complete conversion of full document text into machine readable form is a desirable aim. Benefits would accrue in speed and ease of document transmission, an increased level of machine analysis (including indexing and abstracting and fact retrieval) and improvements in response time. The realization of this aim does not appear feasible within the target period of this study (1978-1988), but is predicted to be state-of-the-art around 1990. Therefore, several tasks are directed toward preparation for the occurrence of this event.

- Coordination of the DoD Information Program

  An improved level of coordination of DoD S&TI and RDT&E management information activities is indicated by the growth and development of individual military service information systems. DDC should take a leadership role in this coordination activity. Therefore, several objectives are directed toward having DDC act as a focal agent for bringing together and coordinating DoD information activities.

- Single-Source Access

  There is a growing trend toward information interdependence. Coordination and standardization among non-DoD information agencies will allow S&TI users to query many potentially useful information sources from a single point in a way which will make the complexities of switching and retrieval much easier and simpler for the S&TI user. DDC should play an active role in this coordination of non-DoD information agencies.

Figure 3 provides an overview of the recommended DDC goals and their related S&TI objectives for the 1978-1988 target period. Detailed S&TI objective descriptions are provided in the ensuing pages according to the following format:

- S&TI OBJECTIVE - a statement of measureable technical or management efforts which describes

GOAL I: PROVIDE NEW AND IMPROVED INFORMATION PRODUCTS AND SERVICES

Subgoal A: Provide Comprehensive Scientific and Technical Information (S&TI) Services

Related S&TI Objectives:

1. To provide fact services
2. Provide single point access to S&TI
3. To improve the quality of information provided to DDC users by increasing access to files of analyzed, critically reviewed information
4. To provide new types of information products and services

Subgoal B: Provide an Improved RDT&E Management Information System

Subgoal C: To Improve The Effectiveness and Efficiency of Information Processing

Related S&TI Objectives:

1. To increase input and processing effectiveness and efficiency
2. To increase output effectiveness
3. To monitor DDC products and services for quality control

GOAL II: ACHIEVE MAXIMUM POTENTIAL FOR COORDINATING THE RDT&E INFORMATION PROGRAM

Related S&TI Objectives:

1. To plan the DDC program within a defined management environment
2. To review the RDT&E information program
3. To evaluate the effectiveness/efficiency of the RDT&E information program

GOAL III: MARKET RDT&E INFORMATION PRODUCTS AND SERVICES

Related S&TI Objectives:

1. To establish and maintain a program to ensure user awareness of DDC products and services
2. To establish a means of obtaining user feedback for improvement of DDC products and services

Figure 3. Overview of DDC Goals and S&TI Objectives for 1978-1988

a major step toward attainment of a goal

- DESCRIPTION - a brief discussion of the S&TI objective
- RATIONALE AND JUSTIFICATION - perceived problems and needs from the user input and forecasting sources which led to development of the objective
- RELATED TASKS - efforts to be undertaken in order to accomplish the objective during the target period 1978-1988
- POTENTIAL IMPLICATIONS - discussion of impacts of the S&TI objective upon plans or operations

2.1 GOAL I: PROVIDE NEW AND IMPROVED INFORMATION PRODUCTS AND SERVICES

S&TI objectives related to this goal are subcategorized into three subgoal areas:

Subgoal I-A: Provide Comprehensive Scientific and Technical Information (S&TI) Services

This subgoal is directed toward provision of a broader range of S&TI services which are of a substantially different nature than those currently provided by DDC.

Subgoal I-B: Provide an Improved RDT&E Management Information System

Accomplishment of this subgoal will provide DoD and Contractor RDT&E administrators with more reliable and timely information management decisions.

Subgoal I-C: To Improve the Effectiveness and Efficiency of Information Processing

This subgoal is linked closely to Goal II, but is directed toward improving DDC operations and those input/output operations which are performed at the DDC/user/generator interface.

2.1.1 Subgoal I-A: Provide Comprehensive Scientific and Technical Information (S&TI) Services

Four S&TI objectives are related to this subgoal. They are:

- To provide fact services
- To provide single point access to S&TI
- To improve the quality of information provided to DDC users by increasing access to files of analyzed, critically reviewed information
- To provide new types of information products and services

Each of these is discussed in detail below.

2.1.1.1 S&TI Objective I-A-1: To Provide Fact Services

Description:

"Fact service" is a concept which includes a variety of information services in both S&TI and management information, and both numerical and non-numerical. Some types of fact services are:

- Provision of scientific numeric data tables
- Provision of management-related statistics
- S&TI "ready reference" (answers to questions)
- Automated retrieval of "answer-providing passages" from machine-readable text
- Provision of project and staffing information (who, what, dollar value, etc.)

DDC is currently providing some services which fit into this family of services, namely the three management information data base services (WUIS, IR&D, and Program Planning). From this point, DDC must expand to provide other fact services.

Rationale and Justification:

- Users want a better quality of information, including more relevance and accuracy. They are concerned that much information is unreviewed, unverified and unreliable.
- Respondents in the User/Potential User Survey feel that they will need more information by 1980--therefore, the information they receive will have to have greater precision and relevance.
- Fact-type information is not easily available to users currently. Current fact information is generally available only via published materials (such as handbooks) and not as up to date as needed.
- The Expert Panel Review results pointed to fact services as a "high pay-off" area for DDC in the future.

Tasks:

Task 1: Characterize Potential Audience

The potential utilization of "fact services" should be determined (as opposed to the utilization of document services).

Task 2: Determine Types of Fact Services

There are many alternative types of fact services as discussed above, and the possibilities for using various of these must be defined.

Task 3: Make Data Tables Available

A machine-readable data base of critical and most heavily used data tables should be developed and made accessible through DROLS (for query and regular update) as well as via batch search. This could be done most readily through coordination with IAC's and possible integration of IAC files into this data base. (See Goal I, Subgoal A, S&TI Objective 3). DDC could also include in this data base (or otherwise make available) evaluated data disseminated by the National Standard Reference Data Service (NSRDS).

Task 4: Modification of Abstracts

Existing abstracting procedures should be revised so that more informative abstracts are produced. Where possible graphics (photographs, charts, tables, maps, etc.) should be stored with the abstract in the technical report data base.

Task 5: Fact Retrieval and Passage Retrieval

Means should be developed for searching the current technical report data base so that "data items" or "answer-providing passages" may be extracted from the text of abstracts via on-line query.

Task 6: Full Text Data Base

The current technical reports data base should eventually be phased over into a data base containing the full text (and graphics) of the documents, so that various types of fact and passage retrieval can address the full document (See Task 5 above).

Potential Implications:

Tasks 1 and 2 may begin immediately; Task 3 can begin one year later. Task 3 is independent of the others, and should be considered on-going. Tasks 4, 5 and 6 are related: Task 4 will produce a more informative technical data base report for input to Task 5. Procedures developed in Task 5 can be adapted ultimately for the new data base from Task 6.

2.1.1.2 S&TI Objective I-A-2: To Provide Single Point Access to S&TI

Description:

The intent of this objective is to provide a single point to put DDC's S&TI users in contact with all potentially useful sources of scientific and technical information. U.S. S&TI sources include the open published literature, non-DoD Federal collections, IAC collections, specialized user collections, and DoD S&TI and RDT&E documents (technical reports, notes, memoranda, etc.). Full realization of this objective will not be accomplished by 1988. However, the objective includes a number of technological tasks, many of which can be completed in the next decade preparatory to implementation of the ultimate single point access system.

Rationale and Justification:

- Resource sharing through networks provides significant (though not measurable) economy.
- Active interagency cooperation at the operational level among important information agencies is currently minimal. Intercourse appears to be at the informal level rather than at a task oriented level.
- Users are inefficient and unsophisticated at utilizing the many independent information resources potentially available to them.
- Single-point access is predicted to be among the most important trends in the information community.

Tasks:

Task 1: Develop Comprehensive Resource File

The first step will be to develop a sophisticated and virtually complete knowledgeability file of potentially useful S&TI resources. As a minimum, this file should include the current DDC referral service data bank, the resources of U.S. commercial systems (such as Lockheed's DIALOG and the SDC equivalent), IAC collections, significant personal and user organization collections (i.e., a skills inventory), and a central file of journal holdings of major DoD laboratories.

Task 2: Advisory Service

Next, a DDC advisory service should be developed to assist S&TI users in effectively utilizing information resources not available from DDC, especially services accessing the open literature.

Task 3: Policy Task Force

A task force should be assigned to set policy and actively examine and report upon the economic and technical feasibility of providing expanded search and retrieval capability through DDC to commercial network S&TI resources, and additional Federal S&TI resources (especially fact services).

Task 4: Expand DoD-Relevant S&TI Literature File

DDC's document collection and technical report data base is essentially limited to DoD-funded technical reports to the exclusion of other less formal or interim reports (such as notes, memos, unpublished papers, speeches, etc.) or relevant but non-DoD funded technical articles, surveys, handbooks, product specifications, etc. To some extent the three IAC's have added much data, but these data do not fit the technical report "mold" and are considered IAC data and not DDC or DoD data.

DDC should set up acquisition, review, screening and input procedures to enable military activities to identify and input citations to all literature deemed having S&TI relevance to an aspect of DoD's mission.

Task 5: User-Specified Data Base Selection

A computer-based network should be provided for users to access on-line relevant data bases according to the individual data base protocols.

Task 6: Query-Driven Data Base Selection

The network described in Task 5 should be further developed to provide for the transparent interaction of a variety of data bases, automatically, through a single protocol.

Potential Implications:

The potential impact of this objective goes beyond DoD. However, the objective is of such significance that a key agency like DDC must assume the duty of much of the basic work to be done in setting a firm foundation for its gradual, but eventual achievement.

R&D work will be required to establish a basis for cost/benefit analysis with agencies and commercial firms responsible for the development of

equipment and software required to support computer networks.

Benefits to be derived from this objective will be realized in the course of its evolutionary development.

- Relevant information resources will be easily accessible, and therefore more effectively used.
- Duplication of effort among Federal information agencies can be reduced.
- Interagency cooperation on technical efforts will be enhanced with resultant economy.
- Individual users will have improved and simplified access to a broad range of information resources.

2.1.1.3 S&TI Objective I-A-3: To Improve the Quality of Information Provided to DDC Users by Increasing Access to Files of Analyzed, Critically Reviewed Information

Description:

Currently, DDC operates almost totally independent of the DSA IAC's. The "almost" is qualified by the fact that a DDC/IAC support package has been in operation since late 1974. Three IAC's participate by inputting their data via RTIS. Plans to expand this package are limited to IAC's which voluntarily request support and which DDC can support with available resources.

Using the IAC support package as a base, DDC can work from a decentralized coordinated and standardized input posture toward integration of DDC and IAC files to provide all DDC users with critically analyzed outputs in response to requests as well as in the subscription mode.

Rationale and Justification:

- Quality of information is the top-ranked problem perceived by DDC users
- Information analysis is predicted to be an increasingly important component of technical information services
- Users want single point access
- Single point access to decentralized files is predicted to be an important future event by the Expert Panel
- Users report that the document-based systems provide too much extraneous information

Tasks:

Task 1: Review IAC Processing

DDC should develop a plan for integrating citation files for IAC's, study IAC literature coverage and overlap in acquisitions/processing and develop specifications for on-line authority files, duplicate checking, computer validation of critical data elements, and bibliographic record/data element standardization. This task adds up to a comprehensive review of all DSA IAC inputs, processes, and products. The end product would be a report documenting current, planned and recommended IAC methods and procedures.

Task 2: Storage and Output System Design

Given a description of current and planned IAC products, a system can be designed for making these available through the DDC, using either the on-line system for data base output or a switching concept for provision of IAC products which are not directly available from DDC, but which could be forwarded to DDC requestors from the IAC. The design should consider use of decentralized processing to the extent that the IAC's can support such processing. The design concept should emphasize the role of DDC as a controlling and switching center, allowing single-point access to all IAC's. But it should also de-emphasize central storage and retrieval of IAC information by DDC. In essence, the design concept should visualize a "spoked-wheel shaped" network of IAC's with DDC at the hub.

Task 3: Pilot Implementation and Test

Using the IAC's currently participating in the Support Package as a model (e.g., MCIC, NTIAC and Plastec), the DDC/IAC network concept should be implemented and the results be evaluated. Evaluation should be carried out in terms of:

- Request Volume - is there any increase in IAC use either directly or through DDC?
- User Satisfaction - use of unobtrusive measures, such as "repeat business" is preferable to a user survey.
- Efficiency Measures - does the network reduce costs when compared to independent operations?

Task 4: Modification of Design

The test and evaluation will result in modifications to the design. As these modifications are implemented, care should be taken to ensure that the system concept as a whole can be generalized to include all DSA IAC's.

Task 5: Expansion to All IAC's

Initial expansion of the network should encompass in step-wise fashion, the inclusion of all eight DSA IAC's, but should consider eventual inclusion of Military Service IAC's in order of volume of use.

Task 6: Skills Inventory

Related to the foregoing task is the development of a skills inventory of "who knows what" in the DoD RDT&E community. As a logical extension of the DDC Referral Data Bank, users could automatically receive names and telephone numbers of individuals knowledgeable in subject fields related to their requests. Careful review of the relationship of such files to the Privacy Act of 1974 will be required.

Potential Impact:

A fully implemented DDC/IAC network with a majority of the DoD IAC's would impose a significant storage load upon DDC computing facilities. Communications access in such a network would be enhanced through ARPANET participation.

2.1.1.4 S&TI Objective I-A-4: To Provide New Types of Information Products and Services

Description:

Until recently, DDC has been a document-oriented information service. The addition of the RDT&E management information data bases (WUIS, IR&D, and Program Planning) indicates that the mission of DDC extends beyond bibliographic storage and retrieval. As yet, the techniques applied to these data bases are primarily document-oriented.

In recognition of the fact that DDC is in the information and communication business and not in the document business, new products and services should respond to non-document requirements for dissemination of information.

Those new products and services which continue to be document-based must respond to user requirements for more specialized, targeted products.

Rationale and Justification:

- Users want targeted, rather than broad, generalized products
- DDC should move from bibliographic and toward information service
- Documents are too lengthy, but abstracts are too short: alternative means of information dissemination are needed

Tasks:

Task 1: ODDR&E Scientific Conference Program

In recognition of the fact that the scientific conference is a well established means of information dissemination, DDC should assume responsibility for administration of the Conference program currently administered by ODDR&E. The announcements should be widely distributed through a variety of media, including the group profiling system currently effective for the Current Awareness Bibliography and ADD programs. User feedback systems (described as a separate objective) can be used to formulate content, scope, and nature of future conferences. Conferences should be indexed by subject for inclusion in Report Bibliographies and Current Awareness Bibliographies. DDC should publish, index, store, and announce conference proceedings.

Task 2: Teleconferencing

On an experimental basis, DDC should investigate the usefulness of 2-way remote videoconferencing as a supplement to the conventional scientific conference.

Task 3: Targeted Announcement Services

The Current Awareness Bibliography service is a targeted announcement service. Its success and projected demand are very high, yet limits are currently placed on this service since it is free. Users, however, indicate that they would be willing to pay for services tailored to their needs. That this is true is illustrated by the success of ADD: a paid, targeted service. Therefore, an alternative, paid Current Awareness Bibliography service, should be investigated. Facets to be explored are:

- Group vs. individual profiling
- Rate structure
- Hard copy vs. COM-generated microfiche as medium

Conceptually, this service would produce a series of targeted, paid "mini-TAB's".

Potential Implications:

The provision of new and improved information products and services will be the function of a newly-designed Product Development Group (discussed elsewhere). New product plans should be market tested and evaluated for costs and effectiveness, using criteria discussed elsewhere.

2.1.2 Subgoal I-B: Provide an Improved RDT&E Management Information System

This subgoal is distinct from Subgoal I-A in that it addresses the RDT&E management information system, rather than S&TI. However, the components of this subgoal are so closely interrelated that it may be treated as an S&TI objective.

Description:

This objective is directed toward the development of a common tool to facilitate communications among DoD RDT&E managers. Accomplishment of this objective will result in a common system serving the three military branches and ODDR&E. The separate systems currently operating in the three military services require that the management reports produced by the Army, Navy and Air Force be interpreted differently. DDC management services should be expanded to provide information to improve control by managers at the project level.

Rationale and Justification:

- RDT&E MIS systems have evolved separately in the military service branches and in DDC without DoD wide cooperation and direction. Consequently, the systems are only superficially compatible.
- It is difficult to interpret the meaning of much of MIS output, especially at high management levels, e.g., ODDR&E.
- Different military systems, separately maintained, represent a duplication of cost and effort.

- WUIS, viewed as a corollary system for higher management by the RDT&E managers, is not enthusiastically maintained with updated information.
- Input to WUIS takes too long to make the system useful to many managers.
- Management personnel report that the quality of DDC information is farther from meeting their needs than do bench level users.
- Support personnel have underestimated the level of dissatisfaction among RDT&E managers as users of DDC information products, possibly providing overly optimistic feedback to DDC in past years.
- Managers who rely on DDC information support are less satisfied than those who do not use DDC service.

Tasks:

Task 1: Review the current RDT&E management tools

DDC should undertake a comprehensive review of the current RDT&E management tools currently operated by DDC, the Army and the Air Force to determine their respective capabilities and requirements. Concurrently, new concepts in MIS analysis and reporting techniques should be investigated.

Task 2: Establish an MIS task force at the ODDR&E level

DDC should take the initiative to assist in establishment of a DoD wide MIS task force, preferably at the ODDR&E level. Task force responsibilities would include:

- set responsibility for a DoD-wide RDT&E MIS
- establish policy for implementation and program management

(See also Task 1, S&TI Objective II-2)

Task 3: Preliminary design for DoD-wide MIS

DDC should perform a systems analysis and preliminary design study for a DoD-wide RDT&E MIS based on hierarchical reporting requirements from project management level to ODDR&E. Definition of system configuration, input modes and reporting requirements should be provided.

Task 4: Functional plan and design

DDC should develop a functional plan, then a detailed design for a DoD-wide MIS.

Task 5: Implementation

Responsibility should be assigned for implementation and maintenance of a comprehensive DoD-wide MIS.

Potential Impact:

There are both cost and political considerations implied by this objective. A major systems effort such as this will have a significant cost impact over the ten year period. The benefit will be seen at the DoD-wide level rather than at the project level. The output of a combined, hierarchically structured RDT&E MIS will be more meaningful in decision analysis across the three services, more readily facilitating the management of complex RDT&E efforts jointly undertaken by all military services. It will be extremely important to assure that the parties involved in setting the policy and designing the system objectively represent the interests of all affected organizational and individual users.

2.1.3 Subgoal I-C: To Improve the Effectiveness and Efficiency of Information Processing

This subgoal consists of three S&TI objectives:

- To increase input and processing effectiveness and efficiency
- To increase output effectiveness
- To monitor DDC products and services for quality control

2.1.3.1 S&TI Objective I-C-1: To Increase Input and Processing Effectiveness and Efficiency

Description:

Currently, DDC has a centralized technical report processing system, in which supplier organizations submit document input to the central DDC facility, where the documents are processed and entered into the technical report data base. The new RTIS may be used for decentralized input to the DDC data bases. Many document supplier organizations perform document input processing similar to (but independent of) DDC. DSA IAC's also perform DoD document input processing. This objective is directed toward the elimination of duplicate input processing through the decentralization of these functions.

Objectives directed toward output effectiveness and marketing discuss the establishment of Regional Centers. These centers can serve as control points in decentralized document input and processing.

Rationale and Justification:

- Current DDC inputs are incomplete (local processing might encourage ready submission)
- Input currently takes too long to get into the system
- Decentralized input would minimize duplicate processing
- A decentralized system can be used for many purposes, including output and marketing

Tasks:

Task 1: Establish Regional Centers

Regional Centers should be established at centralized user locations throughout the country. (See S&TI Objective I-C-2, Task 1)

Task 2: Identify Possible Processing Points

Many DDC document provider organizations currently perform in-house document processing activities. Some of these would be willing to assume responsibility for processing a certain number of DDC documents in return for subsidy from DDC or other compensation, or as a result of DoD-directed action. The purpose of this task is to identify such organizations.

Task 3: Standardization and Training

Document input and processing procedures must be reviewed carefully and standardized to facilitate a high quality of decentralized processing. Input and processing functions should be well documented and a training program developed and implemented to assure uniformity of practice.

Task 4: Fix Processing Responsibility

The DSA IAC's will be given responsibility for processing and inputting (via the RTIS) documents in their subject areas. Responsibility for processing other documents will be divided among those designated document provider organizations identified in Task 2, above.

Task 5: Set Up and Run a Decentralized System

DDC document provider organizations will submit technical reports as well as other categories of relevant literature such as technical notes and technical memoranda. The Regional Center staff will determine whether the document subject is categorically relevant to the area of any IAC's. If so, it will be sent to the appropriate IAC where it will be analyzed, and input to the DDC system via the RTIS. The physical document will then be sent to DDC for microfilming. Non-IAC documents will be sent to a designated document provider/processor organization. Monitoring of input will be checked on-line before new records are merged permanently into existing data banks. (See S&TI Objective I-C-3).

Task 6: Full Text Input

When the conversion to full text document storage in machine-readable form becomes economically and technically feasible (predicted to be about 1990), the full text of documents will be converted to digital form and input via the RTIS. COM and teleprinting can make document copies available in other media.

Task 7: Machine-Aided Processing

DDC should continue its development of natural language processing to move further toward machine-generated indexes and abstracts.

Potential Impact:

Decentralization of document processing represents a sharp departure from the current practice, but yet can be seen as a logical progression from the current (partial) decentralization of management information input. Centralized standards, guidance and coordination are required for effective implementation.

Another major point of impact is the potential dependency of full text storage and retrieval on relatively inexpensive, high density storage. Results of the Literature Survey, however, indicate that new developments in primary technologies (such as holographic and "bubble" memories) are approaching state-of-the-art and by the 1990's will be more fully developed and utilized.

2.1.3.2 S&TI Objective I-C-2: To Increase Output Effectiveness

Description:

DDC has recently (June 1975) completed a study of the length of time it takes to deliver a document ("product") from the DDC mail room to the user. The average delivery time was determined to be three days. However, Middle Atlantic delivery time (i.e., within an area close to DDC) was two days; West Coast area delivery time was four days.

This objective is directed toward making document delivery faster by establishing small depository centers (Regional Centers) at key points around the country. It also addresses the simplification of request and query procedures and the man/machine interface.

Rationale and Justification:

- Current response time for document requests and bibliographies is too long; in the future, shorter response time will be needed
- Local facilities staffed by trained personnel can provide end users with a higher quality of service than can a large central facility
- Security classification presents problems in flow of information

Tasks:

Task 1: Establish Regional Centers

Geographical clusters of DDC users should be determined, and up to 10 Regional Centers established at points central to these clusters. The subject interest profiles of the DDC users in the area of each Regional Center should be determined, and the Center supplied (via ADD service), with microfiche of the DoD documents most likely to be beneficial to those users in the Center's area. Requests for documents would then go by phone to the Regional Center. If the Center supplies a document it should be delivered within two days. If the Center cannot supply the document, and rapid delivery is required, DDC should supply the document by an alternative to U.S. Mail, such as a private courier. Users should pay a premium for this express delivery service.

Task 2: Access to Classified and Limited Documents

Classification and limitation policy and procedures should be reviewed and modified to broaden distribution of information; e.g., TAB and limited

document titles, abstracts, and summaries should be declassified and unlimited wherever possible.

Task 3: Facsimile Delivery

As facsimile speeds increase and costs decrease, the document delivery system described in Task 1 above may be converted to incorporate high speed facsimile transmission of documents from DDC to Regional Centers, replacing express mailing of requested documents that are not available from the Regional Centers.

Task 4: The Human/Information Interface

An on-going testing program should be conducted on the relationship of the social science disciplines and information problems, including the following: alternative protocols and languages for on-line interaction; human engineering for improved information representation and display; methods of analyzing automatic (or semi-automatic) feedback from use of information systems.

Task 5: Full Text Transmission

When full text of documents becomes available in machine readable form, document delivery systems should be modified so that documents requested on-line from CRT (DROLS) in the user organization can be delivered from DDC by digital transmission. Output would be in machine readable form (tape, etc., or on CRT) or COM (if user organization has the equipment) or hard copy from an off-line printer. Regional Centers should serve as intermediaries in these procedures for delivery to organizations without on-line connections.

Potential Impact:

The Regional Centers described above also serve a function in the input and processing of DDC documents, and marketing of DDC products and services. These functions are discussed under other S&TI objectives.

2.1.3.3 S&TI Objective I-C-3: To Monitor DDC Products and Services for Quality Control

Description:

Effective decentralized input and processing are dependent on quality

control via application of agreed-upon policies and standards. Effective information delivery is likewise dependent on continuing knowledge of just how information delivery is actually happening.

DDC should first set monitoring policies, then incorporate into existing procedures ways in which additional data can be gathered, and steps to be taken based on this data. Essentially, this objective is directed toward the implementation of an "internal MIS" to provide DDC administrators with both qualitative and quantitative information on DDC input, processing, and output. To the extent feasible, this monitoring system should be under electronic control.

Rationale and Justification:

- There is currently no way of continually obtaining feedback regarding response time, types of requests, subject areas of greatest interest
- When decentralized processing is implemented, monitoring will be necessary to ensure quality control and minimize duplication of effort

Tasks:

Task 1: Determine Policy

Determine what data items must be gathered as part of the

(a) input and processing monitoring

(b) output (use) monitoring

and how these data items can feed into:

(a) error correction in input and processing

(b) procedures design and standardization

(c) marketing to users

(d) design of new and improved products and services

Task 2: Monitor Input and Processing

Data records input as a result of decentralized processing are currently checked by DDC technical monitors before the records are input into the data bases. This checking can be done on-line via a DROLS terminal, and corrections made on the spot. New text editing software for error correction should incorporate a module which would track the types of corrections made and from what processing facility they originated. Retraining can then be directed to the processing facilities where it is most needed.

Task 3: Monitor Output (Use) of DROLS

Automatic monitoring (with creation of a permanent "history file") can be built into user DROLS terminals to monitor

(a) Total request/response time

(b) Types of queries and requests, by facility

(c) User comments (users can be encouraged to type in comments at the end of a search)

(d) Subject areas of queries and requests, by keywords. (This would result in a sort of user profile of a facility.)

These figures would give a more detailed picture of system use than is currently being done.

Task 4: Monitor Document Delivery

In June of 1975, DDC conducted a study of elapsed time between when a document left the DDC mail room, and when it was received by the user. This was done by enclosing post card response units in each document shipped out in the course of one week. This type of study should be repeated at regular intervals (say quarterly) on a smaller scale (one to two days). The analysis of returned cards would be by computer. Comparison studies should take into account the reactive speed of deliveries of unclassified/unlimited, limited distribution and classified documents.

Potential Implications:

This monitoring objective should not be confused with the management evaluation and control objectives (Goal II), or with the user feedback objective (III-3). Monitoring tasks described here do not involve measuring effectiveness, or user utility, but are designed to gather (as unobtrusively as possible) elementary data on the quality of DDC input, processing and output activities, "keeping a finger on the pulse." This data, however, could be later used as input to fulfilling management and marketing objectives.

2.2 GOAL II: ACHIEVE MAXIMUM POTENTIAL FOR COORDINATING THE RDT&E INFORMATION PROGRAM

This goal consists of three S&TI objectives:

- S&TI Objective II-1: To Plan the DDC Program Within a Defined Management Environment
- S&TI Objective II-2: To Review the RDT&E Information Program

- S&TI Objective II-3: To Evaluate the Effectiveness/ Efficiency of the RDT&E Information Program

2.2.1 S&TI Objective II-1: To Plan the DDC Program Within a Defined Management Environment

Description:

There appears to be lack of agreement among users and the military services as to the appropriate role for DDC in DoD's information program. Views range from that of a document storage and delivery service to a comprehensive centralized information service. Such an environment makes it virtually impossible to define an efficient DDC plan of operations which will be equally acceptable to all members of the DoD RDT&E community. This objective is directed toward a working definition of DDC's area of information responsibilities as defined by the direction of ODDR&E and the military services.

Rationale and Justification:

The rationale and justification for this objective comes principally from two sources:

- Documents received from DDC regarding DoD and DDC S&TI and RDT&E management information programs (note that the DoD information program encompasses more than DDC).
- The comparative assessment of the success experienced by the information processors surveyed in the Interagency Survey.

  Problems which lead to this objective were:

  - DDC's role in the DoD technical information program is not consistently defined among the military services.
  - Current management of the DoD technical information program is not coordinated throughout DoD. S&TI components operate independently in the military research Directorates and information transfer procedures are not clearly delineated.
  - System development for DoD information (particularly management information) has been uncoordinated, resulting in incompatibility among the military branches.

- The Directorate of Technical Information within ODDR&E has become defunct, leaving the DoD information program, as well as DDC, without established policy direction.*
- Mission oriented information processing agencies have fared best with objective-oriented program planning budgets.
- Inconsistency, due to lack of effective policy enforcement, in the collection, dissemination, and security of the technical information program tends to restrict and limit the effectiveness of DoD technical information exchange.

Tasks:

Task 1: Maintain DDC Liaison with RDT&E Administration Offices

Ideally, DDC should receive its direction from the DoD component responsible for coordinating a comprehensive DoD-wide information program. Since such direction is not currently clear it is incumbent upon DDC to take the lead in coordinating its program efforts with the RDT&E administrative agencies which DDC is designed to support. DDC should establish or appoint an office or individual of primary responsibility to initiate and maintain contact with the RDT&E technical and management offices of the military services and in ODDR&E. Through accomplishment of this task, DDC planners will be provided with a means for receiving continuous input about changing circumstances in supported agencies. They will also be provided with a mechanism for obtaining direction for the DDC program from the supported agencies. This should be particularly useful for reviewing the appropriateness for new services initiated by DDC as well as providing a forum for defining service gaps apparent in the DoD information program.

Task 2: Define DDC's Role

Bearing in mind the increased demands for new services from users, DDC should prepare a position paper on its view of the appropriate role for DDC vis a vis the independent military information programs for S&TI and RDT&E management information. Subsequently, DDC should disseminate its position for review by appropriate individuals and offices in the RDT&E structure. This task is directed toward initiating efforts to provide DDC with a clarified, updated mission statement.

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* This is a direct quote from Especially DDC, p.36, and that it is valid was established by the Interagency Survey. A related Especially DDC passage is: "Through the years the direction of the DoD scientific and technical information program has diminished, and in some areas disappeared." (p.36 and again on p.45)

Task 3: Conduct Periodic Review of DDC's Plans with RDT&E Administration

DDC should periodically (e.g., at least annually) review its plans and proposed program changes with RDT&E administrators in military research activities and ODDR&E. This task will involve the RDT&E administration in the planning of appropriate information support programs. More importantly, it will provide a means of eliciting a measure of user support for the DDC program.

Potential Impact:

Focalized coordination of the DoD information program with R&D offices concerned will result in an information program equally responsive to the requirements of DoD management and technical users. In addition to coordination with DoD agencies, the primary impetus of this task, similar coordination with other Federal agencies should also be regarded as an appropriate function.

2.2.2 S&TI Objective II-2: Review the RDT&E Information Program

Description:

Continual review of the DoD RDT&E information program is required to determine whether plans are being carried out, policy is being followed, standards are being met, and if adjustments or program modifications are required. Review of the total program is the prerogative of ODDR&E and research directorates of the military services. However, DDC is in a focal position conducive to a role as coordinator of the review process. This objective is directed toward establishing a managerial process in which DDC serves ODDR&E and the military services by providing them with information and analysis about the effectiveness and needs for improvement in the information program.

Rationale and Justification:

- The multiple military service information systems lack coordination. These systems are insular, deterring DoD-wide use.
- A communications gap exists between DDC and DoD administrators which appears to be due to the lack of involvement by ODDR&E in the management review of DDC products and services.

Tasks:

Task 1: Review of Existing Systems

A task force should be established in cooperation with ODDR&E and the joint military services to review all existing DoD S&TI and RDT&E management information systems for overlap and duplication and to report findings (see Task 2, Subgoal I-B). The task force should propose standards for those systems which have utility across the military services and make recommendations for system integration and merger, where applicable.

Task 2: Define Areas of Responsibility

Some activities can best be performed locally, which others are more effective and efficient when centralized. Each category of activity must be identified. Then, development and operations responsibilities must be designated in order to avoid duplicate development costs for major information systems within separate branches of DoD.

Task 3: Identify Service Gaps

Service gaps (i.e., areas of identified user need for which no agency has clear responsibility) (e.g., fact services) must be identified. After review of system capabilities, responsibility for filling these gaps must be assigned.

Potential Impact:

The value of the S&TI program derives directly from its ability to support the ODDR&E technical program. Therefore, the information program priorities should be assigned as a consequence of ODDR&E and military service review. Review, endorsement and support for the structure of the RDT&E information program by ODDR&E and the military services will provide a means of ensuring DoD-wide cooperation for the development and operation of information services with a minimum of duplicate effort.

2.2.3 S&TI Objective II-3: Evaluate the Effectiveness/Efficiency of the RDT&E Information Program

Description:

This objective is directed toward establishing an integrated relationship between DDC's information program and DoD's RDT&E program objectives.

Despite the validity of DDC's S&TI and service objectives, it does not necessarily follow that improved service and new information products desirable to S&TI users are directly beneficial to the objectives of DoD management as perceived by non-RDT&E administrators. This relationship must be clearly demonstrated.

Rationale and Justification:

- The approval authorities for DoD RDT&E S&TI programs have difficulty in perceiving the value of DDC information products and services
- Users have difficulty in attaching an empirical value to information service, either in terms of time saved or money spent
- Published and generalized cost/benefit value systems for information are misleading when applied to a mission oriented information processing environment

Tasks:

Task 1: Identify Exogenous Goals

This task is directed at identifying explicit goals and/or policies relating to the DoD RDT&E program which have implications for the S&TI support mission. These goals represent exogenous forces affecting DDC's capability to respond to its S&TI and service goals. They provide the rationale for DDC's mission. Included in this set of goals are those of DoD administrative and technical directorates superior to DDC and the purely administrative objectives of DDC administration.

Task 2: Identify Measurable Factors

This task will define means of measuring the effectiveness and/or efficiency of various DDC programs in terms of the previously identified administrative, technical and service goal. Measurable factors could include: staff hours, productivity, service response delay (turnaround), and use statistics which can be used to determine system efficiency, product effectiveness, and most important, an assessment of organization benefit (i.e., benefit of information service to DoD) in terms of the overall organizational goals and objectives.

Task 3: Identify Practical Measuring Technologies

Practical measuring techniques for the collected data must be identified. These include on-going productivity measures and inferential statistics. Measuring techniques should be unobtrusive and avoid extensive survey methodologies. The appropriate techniques will be determined by the nature of factors to be measured.

Task 4: Relate the Measured Functions to Goal Achievement

The use of the statistical data must be subjected to critical interpretation. It is necessary to carefully construct the procedures for using the data as a measure of effectiveness and efficiency. The interpretation of the data must be made in line with the previously-identified overall goals in order to be meaningful outside of DDC.

Task 5: Use of a Decision Model

The complexity of DDC administrative environment may be such that a decision analysis model would be helpful in weighing the impact of various product and service options. Consequently, the feasibility for using a decision analysis model should be investigated.

Potential Impact:

The provision of a value system will provide a common basis for presenting and assessing S&TI resource requirements to DoD. It will be useful for:

- policy analysis
- planning and scheduling
- allocation problems

2.3 GOAL III: MARKET RDT&E INFORMATION PRODUCTS AND SERVICES

This goal consists of two S&TI objectives:

- S&TI Objective III-1: To Establish and Maintain a Program to Ensure User Awareness of DDC Products and Services
- S&TI Objective III-2: To Establish a Means of Obtaining User Feedback for Improvement of DDC Products and Services

2.3.1 S&TI Objective III-1: To Establish and Maintain a Program to Ensure User Awareness of DDC Products and Services

Description:

There appears to be a gap in communications between DDC and its users. Many users are ignorant of the range of DDC products and services currently available. Effective promotion of information services must be at once informative, educational, and persuasive, requiring face-to-face contact between users and information specialists. In information studies performed elsewhere, the use of sales letters, selective mailing of brochures and trade-journal advertising of information services has been found to have little effect, whereas training seminars have been proven effective. In the User/Potential User Survey, 75.4% indicated that user training and education would be helpful, and 91.8% of these said they would make use of it, if it were available.

DDC should undertake an aggressive outreach campaign to familiarize a wider range of users and potential users with DDC services and how to obtain and employ them.

Rationale and Justification:

- Most users are unaware of the full range of DDC services
- Users indicate that they would welcome educational programs
- Improved user awareness will result in increased and more effective utilization of DDC products and services

Tasks:

Task 1: Market Segmentation

The User/Potential User Survey showed that user needs, behaviors, and problems depend primarily upon job type. In planning to market DDC services, the programs to be developed should recognize the differences in needs and uses among bench, support and management users. In recognition of the need to be "consumer-oriented," rather than "product-oriented" in marketing strategies, descriptions or models of the information "consumers" and their needs and habits should be constructed.

Task 2: Develop Targeted Programs

Content of marketing efforts will be defined through examination of the requirements of each consumer group. This task will be devoted to defining how each consumer group differs from others and identifying the primary thrust or orientation of each marketing program in terms of these. At the same time, the most appropriate distribution channel for each program can be defined.

Task 3: Institute Seminar Program

Bearing in mind that at least three audiences must be addressed (i.e., support, bench, and management), a program of targeted seminars should be developed. Audio-visual materials (films, slides, and/or video-cassettes) should be prepared and integrated with the seminar. Seminar format should allow for questions and answer, a valuable source of user feedback.

Task 4: Develop Guide Series

For each DDC product or service, a brief, but informative "Guide" should be prepared. Keeping audience characteristics in mind, the "Guide" should briefly describe what a service is, how it can benefit users (by category), and how to obtain it. These descriptions should be extremely succinct, and full use should be made of illustrations. These could be passed out at DDC seminars and each user organization provided with means for display (e.g., literature rack, easel, etc.)

Task 5: Tie-In with DoD Contracting Process

DoD Contracting Officers should be provided with a training program which will inform them regarding the DDC registration process. DDC registration can be made a contingency of RDT&E contract/grant awards, ensuring automatic registration of contractors. DDC should work with Defense Contracts Administration in developing automatic registration procedures and training programs for Contract Officers.

Task 6: Support Personnel Internship Program

Since local librarians and information specialists are the direct interfaces with end users, they should be fully aware of DDC services, how to obtain them, and how they should be applied. Upon registration for services,

support personnel should be invited to participate in an internship program to be conducted by DDC. This program could be conducted at several levels, depending upon the nature of the using organization (DoD vs. Contractor, classified vs. unclassified, etc.) and may be supplemented by the DROLS training program currently in effect.

Task 7: Regional Marketing Activity

The decentralized Regional Centers should act as focal points of marketing of DDC services in their geographic region. Regional personnel should regularly contact low-volume user organizations in the region to provide awareness of available products and services and stimulate use.

Task 8: Increased Distribution of DDC Digest

To stimulate end user awareness of DDC services, DDC Digest should be mailed directly from DDC to project managers as identified in the Work Unit Information System. WUIS maintenance transactions should be used to update an address file which would be used for DDC Digest dissemination as well as for mailing of other appropriate promotional mailing pieces.

Task 9: Use of Routine DDC Outputs for Promotional Purposes

Virtually every DDC output can be accompanied by an awareness device. For example:

- DROLS sign-on/sign-off messages, changed daily
- Microfiche envelopes
- Covers or inserts to technical reports and bibliographies

Content of the messages must be changed frequently to stimulate interest and awareness. Where possible, use of graphics, color, and attractive typography is encouraged.

Potential Impact:

Improved user awareness will result in increased demand for services and products. With increased demand, DDC can expect increases in user requirements for improvements in the dimensions of information service: quantity, quality, response time, currency, formats and media.

2.3.2 S&TI Objective III-2: Establish a Means of Obtaining User Feedback for Improvement of DDC Products and Services

Description:

In concert with the need to be "consumer-oriented," DDC must develop a means of determining user needs and problems on a continuing basis. It must be recognized that a typical "user needs survey" is costly and provides only a "snapshot" of user requirements and problems within a given time frame. As an alternative, a continuing user feedback mechanism (or integrated series of mechanisms) must be established in order to provide guidance and direction to DDC development.

Rationale and Justification:

- Response to requests for maintenance and change has been slow and erratic
- DDC has had difficulty in getting a focused view of what the user community needs. The user community is very dispersed, sometimes apathetic, and has no real spokesman.
- Direct feedback from users is required. Support personnel should not be allowed to act as filters, since their perception of user requirements and problems is not always the same as the users' viewpoint.

Tasks:

Task 1: Establish Criteria and Policy

DDC management must formally develop policies and criteria which will form the basis for development of new/improved products and services. DSAH concurrence should be obtained.

Task 2: Establish Product Development Group

Within a given DDC Directorate, a Product Development Group should be established. This group would not become involved in internal DDC process changes which do not directly affect the user public, such as software conversation, lexicographic research, etc. Instead, it would be responsible for obtaining user feedback, then making new product recommendations or modifications based solely on user requirements. Actual product development may occur in other Directorates, but this Group would monitor progress.

Task 3: Convert DDC Digest into a Medium for Interchange of Ideas

The high degree of user awareness of DDC Digest indicates that this publication can be converted into a vehicle for obtaining user feedback. "Letters to the Editor," a "Q & A" section, and invitations to comment should be included. The Product Development Group would review user feedback obtained in this way.

Task 4: Seminar Questions and Answers

The marketing seminars should allow ample time for questions and answers, not only about current or proposed DDC services, but also about information requirements in general. The input obtained in this way should be analyzed, categorized and compared with other sources of user feedback by the Product Development Group.

Task 5: Reference Request Review

The Reference Services Branch of the Services Division, Directorate of Technical Services (DDC-T) is a direct interface with users, both by telephone and letter. Reports of user inquiries and complaints should be forwarded to the Product Development Group for analysis and correlation with other sources of user feedback.

Task 6: Develop On-Line Monitor

The predicted dramatic increase in on-line system use indicates that development of an unobtrusive on-line monitoring and reporting system would be a useful feedback tool. Software could be developed to provide reports of system feature use, characterization of requests, types of questions asked, etc. A by-product would be a record of system failure, workload, and production oriented statistics.

Task 7: Regional Feedback Mechanism

Regional Centers should compile monthly reports of user inquiries and complaints for correlation with other sources of feedback.

Potential Implications:

User feedback should be a primary basis for product development and service modification. For DDC, implications of user feedback are restricted

only by resource availability for development, implementation and marketing of new products and services.

SECTION III. SCHEDULE OF S&TI OBJECTIVES FOR 1978-1988

The preceding chapter defines a set of S&TI objectives designed to cope with user needs and technological opportunities likely to be encountered in the decade 1978-1988 by DDC. This section presents a recommended implementation sequence which is based on an integrated plan and a logical time phasing of tasks. These tasks, which are directed toward the achievement of the S&TI objectives, will need to be coordinated and properly synchronized if all objectives are to be met efficiently and effectively by the 1988 target date. The time phasing of recommended tasks is based on the technological forecasts obtained earlier in the study and summarized in Section III of Volume II of this Report.

3.1 IMPLEMENTATION PLAN

Section II of this volume defines thirteen S&TI objectives recommended for the target period 1978-1988. Together they are directed at meeting three principal goals:

- Provide new and improved information products and services (Goal I)
- Achieve maximum potential for coordinating the RDT&E information program (Goal II)
- Market RDT&E information products and services (Goal III)

In practice, each of these goals can be achieved independent of the others. However, certain relationships among goals, objectives and tasks and their relative priorities must be recognized.

3.1.1 Goal II: Achieve Maximum Potential for Coordinating the RDT&E Information Program

This goal will have an impact upon the DoD-wide RDT&E information program. Thus, it should be considered to be of particular significance and priority, and its implementation may serve to modify other DDC goals. There is no inherent impediment in implementation of the tasks related to this goal prior to 1978, the initial target date set forth by this study contract.

3.1.2 Goal I: Provide New and Improved Information Products and Services

This goal, the most technologically oriented of the three DDC goals, can be achieved in accordance with the user needs and technological opportun-

ities of the target decade. New types of information products and services can be examined, designed, or implemented independent of other recommended objectives. Single point access (Section 2.1.1.2) is the unifying objective for the full development of the set of objectives under this goal. This same technology will be likely to facilitate the development of a DoD-wide RDT&E MIS useful to all levels of management. However, the desirability and support for a fully coordinated RDT&E MIS (Subgoal I-B, Section 2.1.2) is not likely to be recognized until the centralized S&TI system is operational.

3.1.3 Goal III: Market RDT&E Information Products and Services

The two objectives under this goal can be addressed simultaneously. In the implementation plan, the objective to establish and maintain a program to ensure user awareness of DDC products and services (Section 2.3.1) precedes the objective to establish a feedback mechanism (Section 2.3.2) because certain tasks associated with the former objective will aid in the implementation of the latter. Regionalized service is a key factor in achievement of this goal.

3.2 RECOMMENDED TIME PHASING OF TASKS

The implementation tasks for achieving the recommended objectives are shown in time phased perspective in Figure 4: Time Phased Implementation Plan. Activities which continue beyond 1988 are indicated by arrows. Steps to be taken in accomplishment of the objectives are described below.

3.2.1 Goal I: Provide New and Improved Information Products and Services

(Please refer to Figure 4a)

3.2.1.1 Subgoal I-A: Provide Comprehensive S&TI Services

- S&TI Objective I-A-1: To Provide Fact Services

  - Task 1: Characterize Potential Audience
    Includes review of IAC and DDC user data to determine size and nature of user group who would use specific types of fact services.

  - Task 2: Determine Types of Fact Services
    Includes review of IAC products as well as those of other agencies (e.g., NBS/NSRDS) to determine type of fact service most appropriate for DDC application.

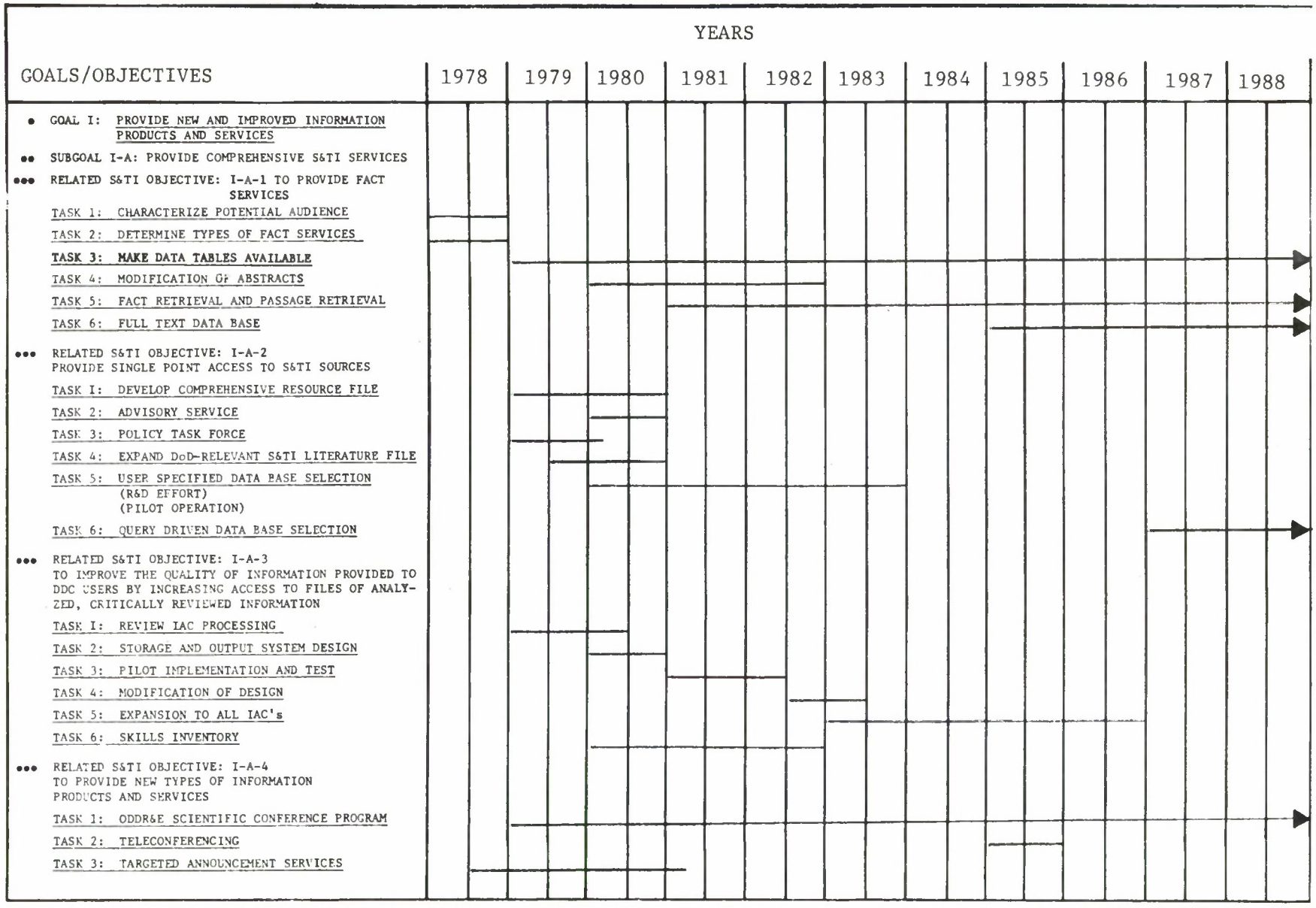

Figure 4a. Time Phased Implementation Plan

- Task 3: Make Data Tables Available
  Includes development of hardware/software specifications, selection, and possibly conversion to machine-readable form.
- Task 4: Modification of Abstracts
  Modification of current abstract format may be required to conform to passage retrieval requirements and specifications.
- Task 5: Fact Retrieval and Passage Retrieval
  Included are the development of weighting mechanisms, possibly based upon MAI techniques, to assist in automatic selection of fact-bearing passages from text, then developing appropriate query and passage matching systems.
- Task 6: Full Text Data Base
  Includes determination of method (i.e., word processing, OCR, etc.) for conversion, hardware selection, and communication technique.

- S&TI Objective I-A-2: Provide Single-Point Access to S&TI Sources

  - Task 1: Develop Comprehensive Resource File
    Accomplished through compilation of a directory of information resources of potential use to DDC clientele.
  - Task 2: Advisory Service
    Includes establishment of a small group of individuals, knowledgeable in both DDC and non-DDC sources, to provide reference services to requestors.
  - Task 3: Policy Task Force
    Investigation of legal and economic implications of providing copyrighted works through DDC, reporting of results and setting policy.
  - Task 4: Expand DoD-Relevant S&TI Literature File
    Involves incorporation into the DDC collection and data base of DoD material other than DoD funded formal technical reports.
  - Task 5: User Specified Data Base Selection
    As a first step, experimentation with the acceptability of commercially available data bases can be investigated. Later, military and related data bases must be linked into an on-line retrieval system.
  - Task 6: Query Driven Data Base Selection
    To allow for system selection of data base(s) appropriate to satisfy query criteria, sophisticated data management and communications techniques will have to be employed to achieve this task.

- S&TI Objective I-A-3: To Improve the Quality of Information Provided to DDC Users by Increasing Access to Files of Analyzed, Critically Reviewed Information

  - Task 1: Review IAC Processing
    All IAC processes should be documented and compared for sim-

ilarities/differences; processing gaps should be identified.

- Task 2: Storage and Output System Design
  This task complements the current DDC project for IAC Input System Design, but specifications for storage requirements and output formats for IAC's should be developed at this phase.

- Task 3: Pilot Implementation and Test
  On a pilot basis, the IAC network concept should be implemented and tested on the basis of "live" data and real questions.

- Task 4: Modification of Design
  Modification of system concepts should be based upon Task 3 (above) test results.

- Task 5: Expansion to all IAC's
  A basis for inclusion in the network should be established, then a plan developed for stepwise inclusion; network expansion activities should be implemented based on this plan.

- Task 6: Skills Inventory
  Consideration should be given to compilation based upon volunteer (or recruited volunteers based upon IAC knowledge and effort) inclusion in this file, then on-line maintenance and update; housekeeping methods will need to be developed to keep the file up to date.

• S&TI Objective I-A-4: To Provide New Types of Information Products and Services

- Task 1: ODDR&E Scientific Conference Program
  A new policy will need to be established to transfer this function to DDC; operation can be accomplished by current staff or through contract assistance.

- Task 2: Teleconferencing
  A feasibility study, possibly incorporating several experimental teleconferences, should be undertaken to determine value and relative appropriateness of teleconferencing applications.

- Task 3: Targeted Announcement Services
  Current ADD subscribers should be pilot audience: choice of full microfiche vs. targeted abstracts should be offered to this group to test acceptance.

3.2.1.2 Subgoal I-B: Provide an Improved RDT&E Management Information System

(Please refer to Figure 4b)

- Task 1: Review the Current RDT&E Management Information Tools
  All military RDT&E MIS should be reviewed in depth and compared to determine similarities and points of commality.

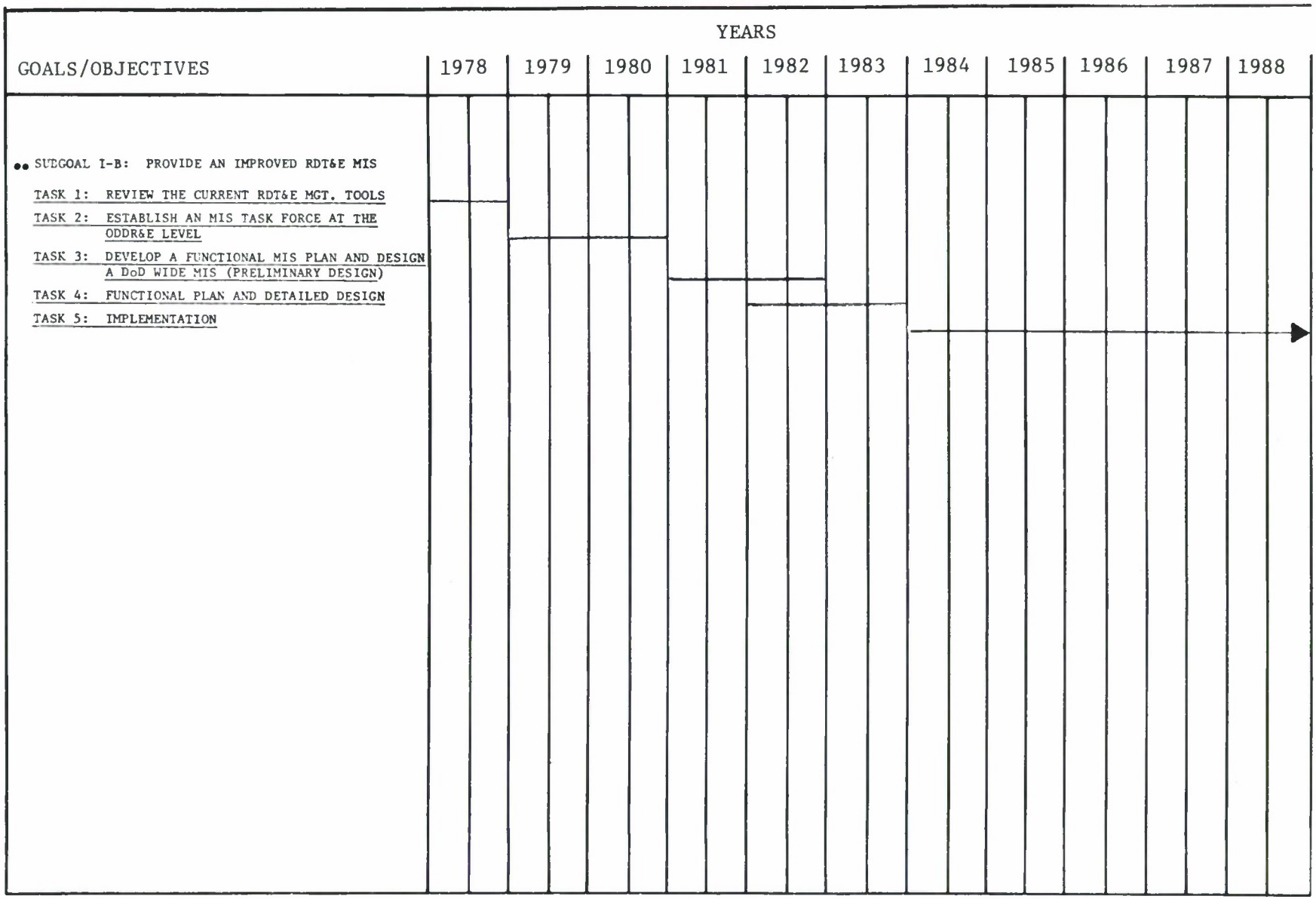

Figure 4b. Time Phased Implementation Plan (cont.)

- Task 2: Establish an MIS Task Force at ODDR&E Level
  DDC must make ODDR&E aware of the need for action and policy setting.
- Task 3: Preliminary Design for a DoD-wide MIS
  System configuration, products, inputs, as well as responsibility for operations must be established.
- Task 4: Functional Plan and Design
  Using the preliminary plan, detailed system specifications should be established and phased implementation plans developed.
- Task 5: Implementation
  DDC should recommend a responsible agency for operations and maintenance of the improved system.

3.2.1.3 Subgoal I-C: To Improve the Effectiveness and Efficiency of Information Processing

(Please refer to Figure 4c)

- S&TI Objective I-C-1: To Increase Input and Processing Effectiveness and Efficiency

  - Task 1: Establish Regional Centers
    Geographic distribution of user population centers should be analyzed and appropriate Regional Center sites selected and their functions defined; consideration should be given to contractor facility management.
  - Task 2: Identify Possible Processing Points
    Major DDC input providing organizations should be identified and each contacted regarding policy of providing DDC with machine-readable input; incentive plans should be developed.
  - Task 3: Standardization and Training
    To the extent possible, input should conform to existing DDC standards; alternative conversion mechanisms should be designed to minimize human intervention.
  - Task 4: Fix Processing Responsibility
    Establish policy for deciding which organizations have specified input and processing responsibilities.
  - Task 5: Set Up and Run a Decentralized System
    Responsibilities of Regional Centers, DDC and input processing organizations must be fixed and a means established for administration of the decentralized system.
  - Task 6: Full Text Input
    Where possible, alternatives to RTIS keying (e.g. word processing, OCR) should be considered and means established to accept alternate sources of machine-readable text.
  - Task 7: Machine-Aided Processing
    New developments in text processing must be sought with the aim of reducing human effort in abstracting and indexing to a minimum.

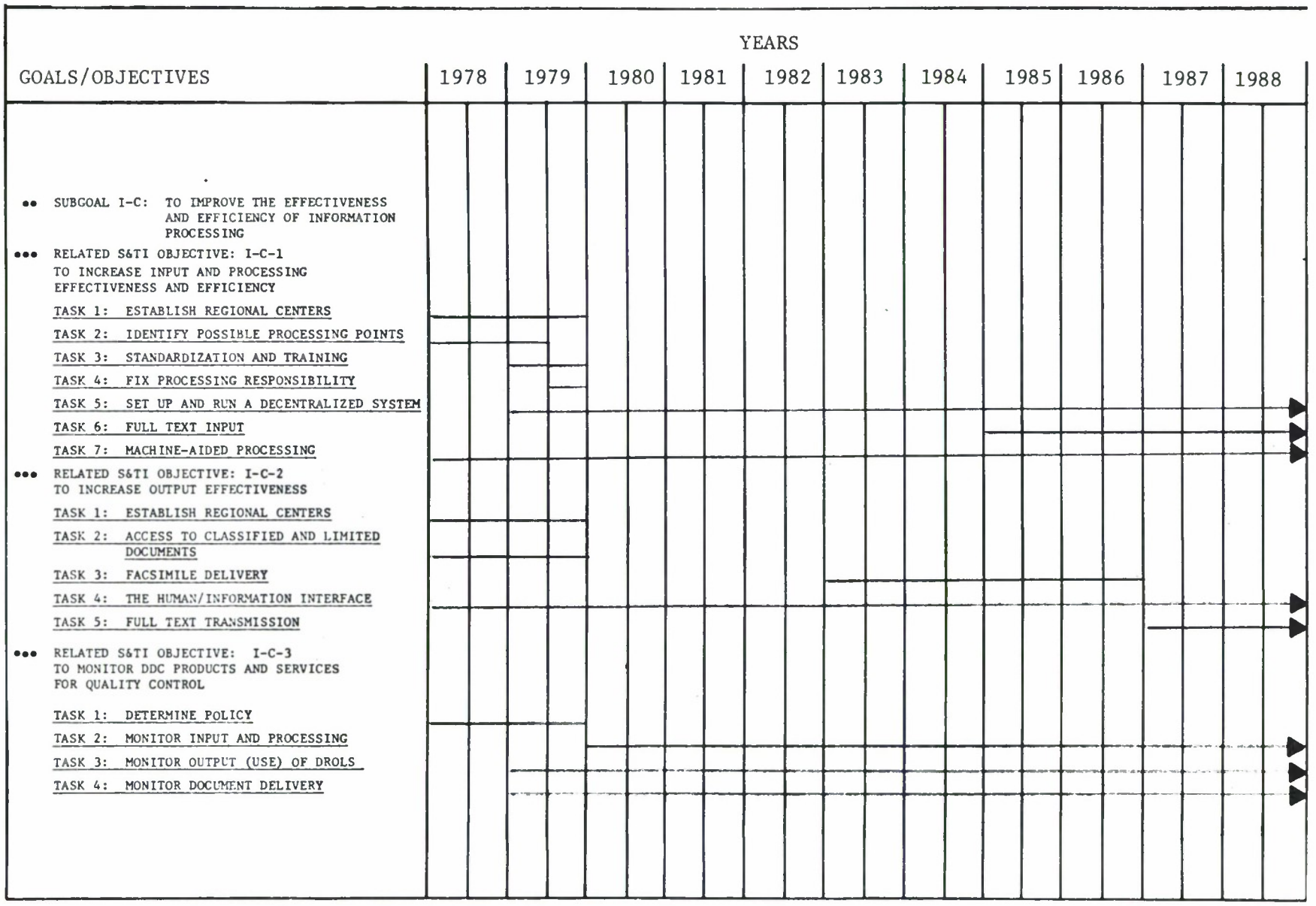

Figure 4c. Time Phased Implementation Plan (cont.)

- S&TI Objective I-C-2: To Increase Output Effectiveness

  - Task 1: Establish Regional Centers
    Profiles of regional interest should be developed as basis for dissemination of documents to Regional Centers; alternatives to U.S. Mail for express delivery should be formulated.
  - Task 2: Access to Classified and Limited Documents
    DDC should bring the needs for improved access to the attention of appropriate secondary authorities, with suggested alternatives.
  - Task 3: Facsimile Delivery
    DDC should plan for implementation of a facsimile network to connect its decentralized organization.
  - Task 4: The Human/Information Interface
    This should be the basis of a continuing DDC program and should address key psychosocial interface issues.
  - Task 5: Full Text Transmission
    DDC should plan to provide document output via telecommunications as this technology becomes available.

- S&TI Objective I-C-3: To Monitor DDC Products and Services for Quality Control

  - Task 1: Determine Policy
    All DDC Directorates must be involved in developing policy and standards for items to be monitored for quality control.
  - Task 2: Monitor Input and Processing
    Quality (as well as quantity) of input items and processing steps must be checked during the process; direct or sampling methods (or combination) can be used.
  - Task 3: Monitor Use of DROLS
    Unobtrusive monitoring software can be established and reporting formats developed to show peaks, errors, types of requests, etc.
  - Task 4: Monitor Document Delivery
    Under the decentralized document delivery mode, Regional Centers can provide data on delivery times, which can be used to develop source-to-end-user estimates.

3.2.2 Goal II: Achieve Maximum Potential for Coordinating the RDT&E Information Program

Please refer to Figure 4d. DDC should act as a key coordinator in accomplishment of this goal. Task activities have been previously described in Section 2.2.

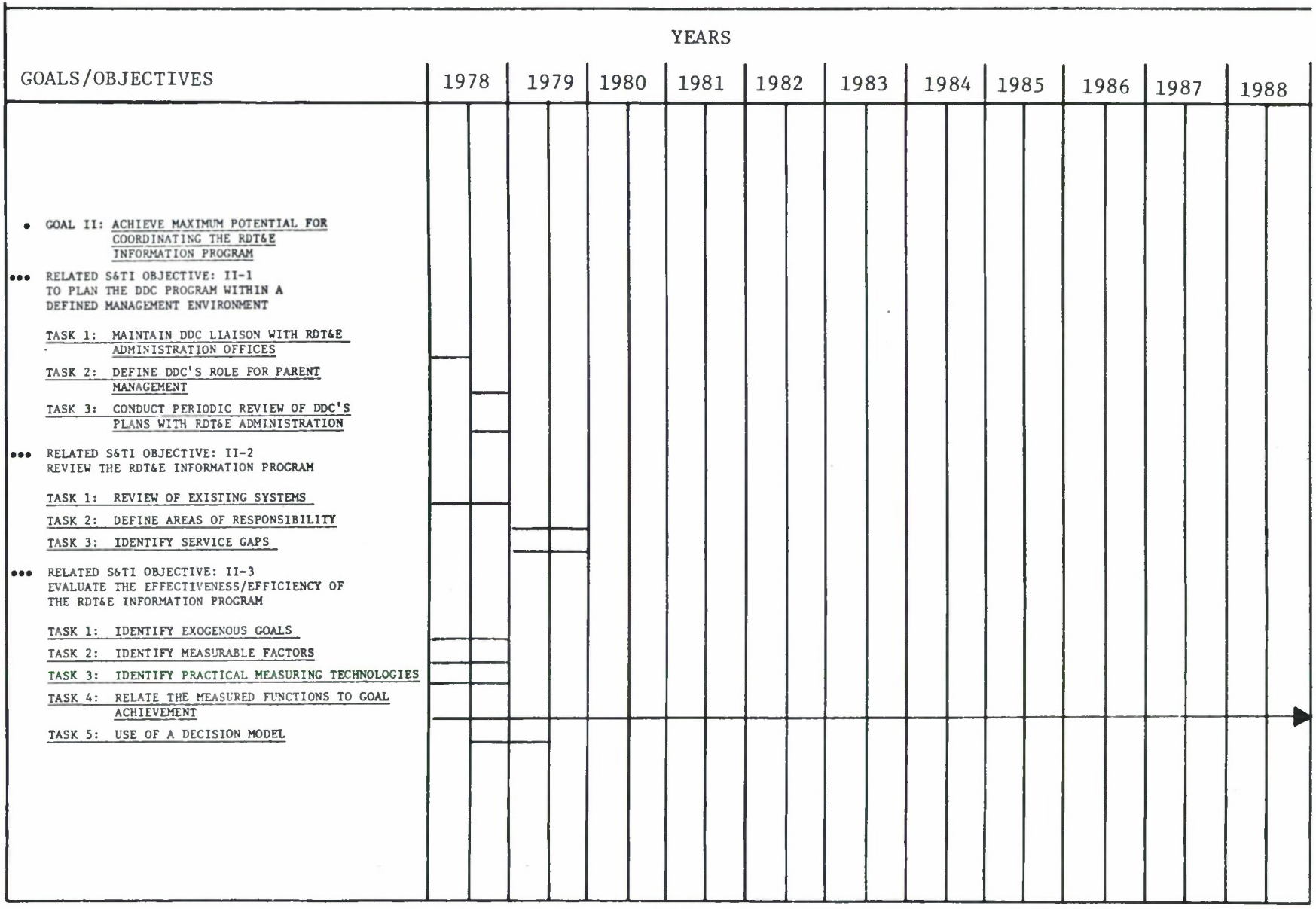

Figure 4d. Time Phased Implementation Plan (cont.)

3.2.3 Goal III: Market RDT&E Information Products and Services

(Please refer to Figure 4e)

- S&TI Objective III-1: To Establish and Maintain a Program to Ensure User Awareness of DDC Products and Services

  This awareness program should include promotion of non-DDC services which serve as adjuncts (e.g., Engineering Index, Atomindex, etc.) "Tasks" as described in Section 2.3.1 are suggested marketing program elements.

- S&TI Objective III-2: Establish a Means of Obtaining User Feedback for Improvement of DDC Products and Services

  As with previous objective, task descriptions (Section 2.3.2) suggested program elements.

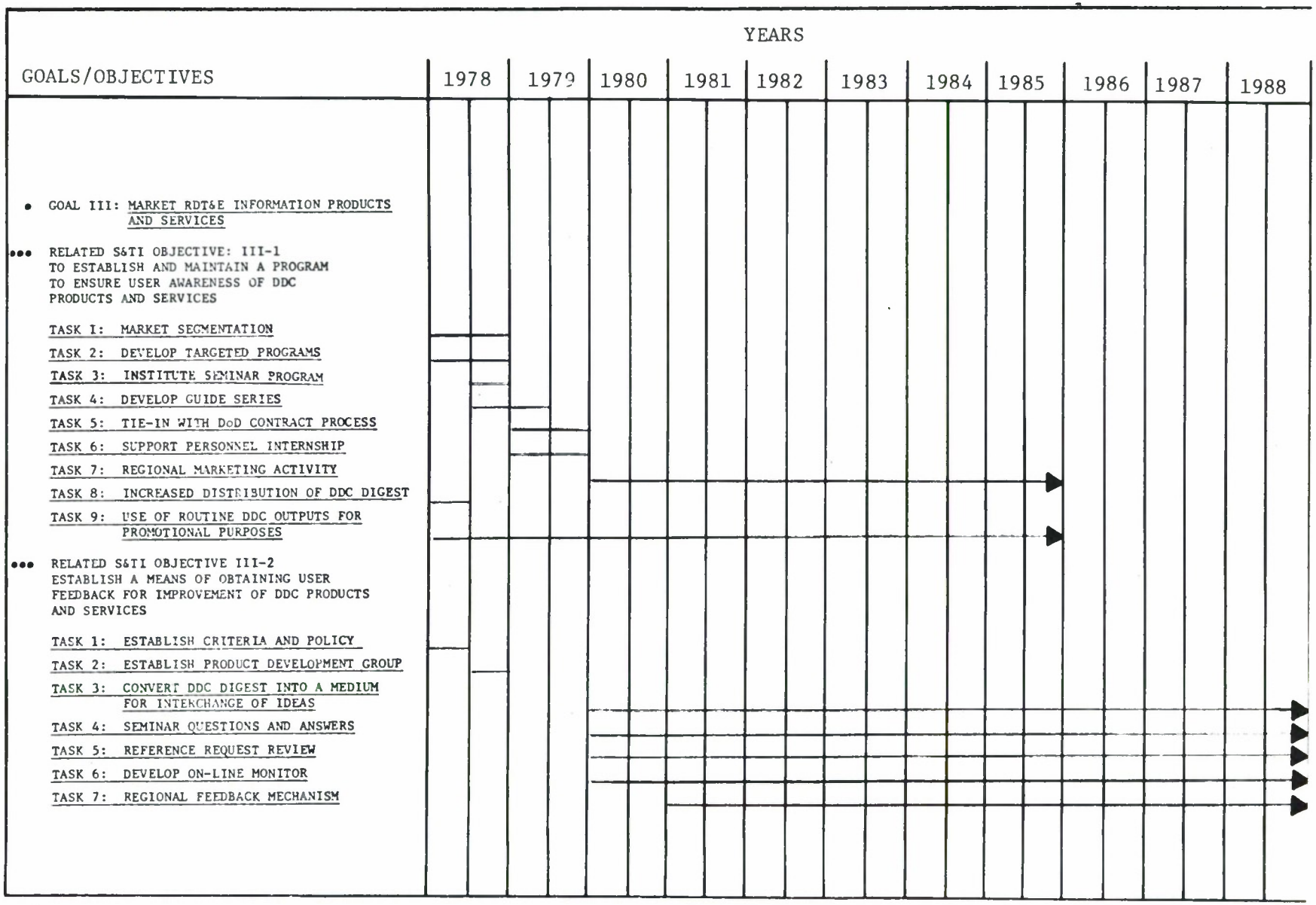

Figure 4e. Time Phased Implementation Plan (concluded)

SECTION IV. CONCLUSIONS

This concluding section will:

- Review previously proposed DDC plans in light of AAI findings and recommended goals and objectives
- Evaluate current and planned DDC services in light of findings
- Provide several overall conclusions

4.1 REVIEW OF DDC PLANS

One of the requirements of the DDC 10 Year Planning and Requirements Study was to review DDC's plans for development of new and improved levels of service, then to compare these plans with the findings of the study. DDC provided AAI with an internal paper "Long Range Objectives 1976-1986," which was prepared in 1974. Since this target period is a reasonable match with the target period of this study, 1978-1988, the paper provided a sound basis for comparing the AAI recommendations with those previously projected by DDC.

The topics covered by the DDC paper are:

- User Needs
- Access to Conventional Forms of S&TI
- Management Information Services
- Specialized Data Bases
- Networking and Resource Sharing
- Service to the Ultimate Information User

Proposed DDC long-range goals are:

- Reduction of Defense RDT&E Information Processing Costs
- Increased Access to S&TI
- Evaluation of Existing Services and Establish New Performance Criteria or Goals
- Decentralized Processing
- Provide New Services and Products
- Market Defense Information Services
- Provide Training Material to Promote More Effective Processing and Use of RDT&E Information

These are followed by sections discussing specific objectives. Each of these sections will be reviewed below in light of study findings.

4.1.1 Access and Use of Scientific and Technical Information

DDC recognizes the need to provide access:

- To a wider range of DoD RDT&E technical information
- To non-DoD RDT&E technical information

These objectives are consistent with the User/Potential User Survey findings and the results of the Interagency Survey. For example, users have a high preference for journals as an information source, and access to these is not currently provided by DDC. Access to a broad range of material from a single point is a highlight of the Expert Panel Review and User/Potential User Survey findings. AAI has emphasized need for DDC to provide access to a more comprehensive range of information in Goal I, Subgoal A.

This section of the DDC memorandum also emphasizes the need to improve the delivery of information. Currently, not all of the variables which affect delivery of information are under the control of DDC. AAI Objective I-C-2 stresses the requirement to improve delivery of needed information as well as to improve other output functions.

Finally, this section of the paper contains objectives to identify information needs other than for technical information, and to provide access to RDT&E related information other than technical information. For the target period, at least, DDC should concentrate upon improving the dimensions of S&TI and RDT&E management information since users predict that their requirements for this information will be greater and that their expectations in terms of information quality, query response time, etc. will be more stringent than they are presently.

4.1.2 Processing and Distribution of Technical Information

The DDC paper emphasizes the decentralization of processing activities, based upon the rationale that redundant input and output processing occur within the RDT&E information community. The AAI technology assessment has predicted a shift away from large, monolithic information processors and toward distributed information processing. Therefore, we have recommended

the establishment of decentralized Regional Centers for the performance of information processing activities (see Objective I-C-1).

4.1.3 Management (Program) Information Processing Functions

This section of the paper states the need to "Provide all levels of RDT&E management. . . with exclusive, selective, and general RDT&E program management information." Capabilities for input, storage and manipulation of this information are to be provided.

This plan is consistent with the recommended Subgoal B of Goal I. But sound planning and comprehensive review of RDT&E management information processes are a prerequisite (Goal II). The User/Potential User Survey has shown that the Program Planning, IR&D, and Work Unit data banks as currently administered by DDC are inadequate for planning and controlling of RDT&E resources at the line management level. Parameters must be established for an effective RDT&E management information system, requirements defined, priorities set, then a data management system developed and implemented for application to this situation.

4.1.4 Internal Organization of DDC

This section of the DDC paper contains objectives for improved organization and management of DDC, with emphasis upon cost/effectiveness, increased productivity, and provision of access to information products and services available from other organizations.

The need for quantification of goals and objectives in order to determine their relative value will be an important first step in the attainment of these objectives. This step is recommended as Objective II-3. Once the optimal product-service mix has been defined, it will be possible to determine which services can be more cost/effectively provided elsewhere with access through DDC. But until cost/effectiveness criteria are established, there can be no objective justification (other than volume of demand) for modification of existing information programs or development of new programs.

4.1.5 Management of Resources

This final section of the DDC paper contains objectives related to improving the management of personnel resources. It addresses problems of underutilization of personnel, reassignments to more challenging positions,

and modification of the skill mix to coincide with the provision of cost/effective quality products.

If DDC pursues such objectives as decentralization of processing functions and extension of machine-aided document surrogation functions (e.g. MAI), DDC subject specialists who are now involved in routine and somewhat clerical tasks will become available for information correlation and analysis functions to improve the quality of output, including preparation of informative summary reports.

4.2 DDC SERVICES

In comparison with comparable agencies included in the Interagency Survey (e.g., NTIS, NASA, ERDA, etc.), DDC's current services were observed to be "state-of-the-art." This conclusion is confirmed by DDC users, who perceive that the services provided by DDC and those provided by comparable agencies meet their needs to approximately the same degree.

There can be no doubt that the DDC Technical Report Program (including TAB) is the service most preferred by current users. However, the lack of awareness of other DDC services tends to bias the evaluation of utility of these services, emphasizing the need for improved user awareness.

Current and predicted user requirements for improved quality in information provided by DDC point out the need for DDC to move from a document orientation to a question-answering mode through the provision of critically analyzed outputs and access to files of factual, verified data, both numeric and conceptual (i.e., fact services). It should be noted that DDC should provide such access, but need not itself perform the input, processing, and analysis functions required in order to produce such outputs. Networking and interfacing with IAC's and other information agencies will allow DDC to act as a single-point switching center, permitting remote access to a vast armamentarium of information resources.

There are strong indications that DDC will have to continue to offer two modes of service (i.e., demand and subscription), at least for the target period of the study. However, it appears that acceptance and utilization of subscription services which are tailored to individual or organizational requirements (e.g., ADD, Current Awareness Bibliographies) will grow substantially in that period. Similarly, the growth in the availability and acceptance of interactive computer terminals heralds an increase in demand for

the Defense RDT&E On-Line System.

In summary, new product considerations should include provision of fact services and improvements in access to non-DDC information resources (Goal I). Future improvements to current services must emphasize quantity, quality, response time, and currency dimensions (Goal I, Subgoal C).

4.3 GENERAL CONCLUSIONS

Improved information transfer in the 1980's will benefit most from:

- Increased utilization of currently available technology

  All aspects of this study lead to the conclusion that the information community has not yet fully exploited technologies which are currently available. Information processing administrators have yet to realize the potential for computer control and electronic communication which has been successfully applied in non-information industries which retail their services (e.g., banking). Hence, improvements in information transfer need not await emergence of new sophisticated technologies. Instead, planners should concentrate upon doing more with existing technologies.

- Interfacing and networking of information processing activities

  Centralized information operations are becoming strained by the volume of information they must store, process, and quickly retrieve. Networking and interagency interfacing can alleviate this problem, and at the same time provide users with vast information resources from a single point source. Before long-term benefits can be achieved, information processing standards must be adopted and improved interagency cooperation and coordination must be accomplished at the operating level.

- Emphasis on human considerations

  Systems problems cannot be viewed independent of intellectual problems of information transfer. These intellectual problems occur at both the individual and organization levels. Improvements in information transfer will have to recognize and deal with man-system interfaces and inter-organizational interactions if they are to become accepted.

- Development of a value system for information

  While it can easily be shown that hardware and communications costs are on a downward trend, the intrinsic value of information is difficult, if not impossible to quantify. Thus, information personnel have little basis for justifying new or even currently operating programs, products, and services. Priorities for information R&D funding should emphasize the development of means to determine cost/effectiveness of information.